# PEKIN LAKE STATE FISH AND WILDLIFE AREA
# NORTHERN UNIT

# CRITICAL RESTORATION PROJECT
# ILLINOIS RIVER ECOSYSTEM RESTORATION STUDY, ILLINOIS

# FEASIBILITY REPORT

**Public Review Draft**
**June 2003**

# Executive Summary

The Pekin Lake State Fish & Wildlife Area (SFWA) - Northern Unit Critical Restoration Project area is part of the Pekin Lake SFWA. The SFWA is located along the Illinois River immediately downstream of Peoria Lock and Dam and adjacent to and west of the communities of Pekin, North Pekin, and Marquette Heights. The area is generally bounded by the Illinois River to the west, the communities mentioned above to the east, Peoria Lock and Dam/Interstate 474 to the north, and Illinois Highway Route 9 to the south. The SFWA is divided into two units, North and South. Perpendicular to the general layout of the SFWA is a rubble causeway supporting Central Illinois Light Company (CILCO) high voltage transmission lines. The corridor is 400 feet in width and owned by CILCO. An additional area, adjacent to the State Fish and Wildlife Area, is being considered as part of this project; a gravel quarry no longer in use, located at the approximate midway point of the Pekin Lake SFWA to the east, is privately owned. This investigation deals exclusively with the Northern Unit of the Pekin Lake SFWA.

Specific authority to conduct the Pekin Lake SFWA - Northern Unit Critical Restoration Project is contained in section 519 of the Water Resources Development Act of 2000. Additional authority is contained in Section 216 of the 1970 Flood Control Act and Section 519 of the Water Resources Development Act (WRDA) 2000, which authorized restoration of the Illinois River Basin.

The principal goal of the Recommended Plan is enhancement of aquatic habitat through the stabilization of water levels and removal of large areas of willow trees. Summertime water level fluctuations along the Illinois River regularly drown moist soil plant communities during their growing season. Further, large areas of moist soil plants have been overtaken by willow trees. Opportunities were explored to address these conditions. Goals to achieve ecosystem restoration include: (1) improved aquatic habitat; (2) improved wetland habitat; and (3) improved terrestrial habitat.

**MEASURES FOR PEKIN LAKE SFWA – NORTHERN UNIT**

The following restoration measures for Pekin Lake were considered in detail to achieve project goals and objectives:

1. No Federal action.

2. Water Level Management achieved through reconstruction of an existing causeway into a levee, installation of control structure, and filling of low spots along the natural bankline of the Illinois River.
3. Water Level Management achieved through reconstruction of an existing causeway into a levee and control structure, filling of low spots along the natural bankline of the Illinois River, and installation of groundwater wells to improve water level management.

4. Removal of approximately 61 acres of willows from Slim and Round Lakes and restoring shallow water conditions for moist soil plant production.

5. Sculpting of sediments in Slim and Worley Lakes to restore depth diversity and allow for a complete drawdown of both waterbodies.

**RECOMMENDATION**

It is recommended that the Secretary of the Army for Civil Works approve the proposed project to include constructing in Pekin Lake SFWA - Northern Unit Water Level Management, Pump and Well, Rehabilitate Slim and Round Lakes, and Sculpting for Drainage Plan in the Northern Unit.

The current estimated first cost of the recommended plan is $6,348,979 (May 2003 price levels). This total estimated project cost includes construction of the project features; planning, engineering, and design; construction management; real estate; and monitoring. Implementation would be cost shared 65% by the Federal Government and 35% by the Illinois Department of Natural Resources (IDNR), the Non-Federal Sponsor. The Federal contribution is estimated at $4,126,837, and the non-Federal contribution is estimated at $2,222,142. The IDNR will provide all Lands, Easements, Rights-of-Way, Relocation, and Dredged or Excavated Disposal Areas (LERRD). The IDNR also will be responsible for the operation and maintenance of the project. The operation and maintenance of these features are estimated to cost $29,575 annually.

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Section 1

# Introduction

## 1.1 AUTHORITY

Prior to initiating Federal involvement in addressing water resources problems, the Corps of Engineers must have authority to investigate the problem. Funds were provided in the Energy and Water Development Appropriations Act of 2001 to complete an initial assessment of the Illinois River Basin. This was in accordance with authority granted in Section 519 of the Water Resources Development Act 2000 to complete a comprehensive plan and identify, evaluate, and implement critical restoration projects in the Illinois River Basin. The authority states:

> ***Critical Restoration Projects***
> *If the Secretary, in cooperation with appropriate Federal agencies and the State of Illinois, determines that a restoration project for the Illinois River Basin will produce independent, immediate and substantial restoration, preservation, and protection benefits, the Secretary shall proceed expeditiously with the implementation of the project.*

Therefore, this feasibility study is being conducted as a critical restoration project under the authority of Section 519 with supplemental authority from the Illinois River Ecosystem Restoration Study, which is being carried out under the Corps of Engineers' General Investigations (GI) Program. That study was initiated pursuant to the provision of funds in the Energy and Water Development Appropriations Act, 1998. The study was authorized by Section 216 of the 1970 Flood Control Act.

## 1.2 STUDY PURPOSE AND SCOPE

The study assesses the water and related land resource problems and opportunities present in the Pekin Lake SFWA - Northern Unit. The development of appropriate ecosystem restoration measures involves a comprehensive examination of the problems contributing to the system degradation and development of alternative solutions. This study further evaluates the Federal and State interest in such ecosystem restoration measures in the Pekin Lake SFWA - Northern Unit. Finally, this study assesses the significance of all potential environmental impacts of the recommended plan.

Due to the broad scope, multiple objectives, and time frame of Section 519 authority, this report serves as an interim response to the overall authority. However, the specific language addressing critical restoration projects is fully satisfied by this study.

The study followed the Corps of Engineers' six-step planning process. This process included the identification of problems and opportunities, inventory and forecast of resource conditions, formulation, evaluation, and comparison of alternatives, and the selection of a recommended plan. Specific investigations included a review of past studies, compilation, development and analysis of bathymetric surveys of Pekin Lake SFWA to estimate historical sedimentation rates over time, numerical and hydraulic models to assess alternatives, preparation and use of Habitat Evaluation Procedures (HEP) models, and cost effectiveness and incremental analyses. The Corps of Engineers and the IDNR jointly conducted the study, with both organizations conducting some of the study tasks individually while jointly working on the overall study effort.

## 1.3 ORGANIZATION OF THE FEASIBILITY REPORT

The study presented in this Feasibility Report has separately bound supporting appendices, including an Environmental Assessment (EA). The purpose of the main report is to concisely summarize the multidisciplinary efforts of the Corps of Engineers and the IDNR that lead to the final study recommendations. This process involves the public as well as the City of Pekin, Illinois.

This report is organized into six sections. These sections include: (1) Introduction, which highlights the study authority, study area, purpose and scope of study efforts; (2) Plan Formulation, which covers a description of the study process, an assessment of problems, opportunities and constraints, and summaries of the formulation and evaluation of alternatives for Pekin Lake State Fish and Wildlife Area (SFWA); (3) Description of the Selected Plan, which details various components and considerations; (4) Plan Implementation, which includes institutional requirements, division of plan responsibility, and views of the non-Federal sponsor and other agencies with implementation responsibilities; (5) a summary of Coordination, Public Views, and Comments; and (6) Study Recommendations.

There are 11 appendices:

- General
- Hazardous, Toxic, and Radioactive Waste Phase I Environmental Site Assessment
- Geotechnical Considerations
- Hydrology and Hydraulics
- Water Quality and Sedimentation
- Cost Engineering
- Environmental Assessment
- Real Estate Plan
- Value Engineering Study
- Distribution List

## 1.4 STUDY AREA

The area of consideration for this critical restoration project is the Northern Unit of the Pekin Lake SFWA (see Figure 1-1). This area is located along the Illinois River immediately downstream of Peoria Lock and Dam and adjacent to and west of the communities of Pekin, North Pekin, and Marquette Heights, Illinois. The area is generally bounded by the Illinois River to the west, the communities mentioned above to the east, Peoria Lock and Dam/Interstate 474 to the north, and Illinois Highway Route 9 to the south. Several manmade features divide the area. First, in the northern portion of the site is Lick Creek, which crosses perpendicular to the site and is incised to such a degree that it provides virtually no hydraulic benefit to the north end. This creek drains residential and commercial areas of Pekin, Illinois, through the Pekin Lake SFWA to the Illinois River. Farther south of Lick Creek is a rubble causeway supporting Central Illinois Light Company (CILCO) high voltage transmission lines. This causeway is also perpendicular to the north-south orientation of the Pekin Lake SFWA and divides the northern unit from the southern unit. The corridor is 400 feet wide and owned by CILCO. An additional area, adjacent to the Pekin Lake SFWA, is being considered as part of this project; a gravel quarry no longer in use, located at the approximate midway point of the Pekin Lake SFWA to the east, is privately owned.

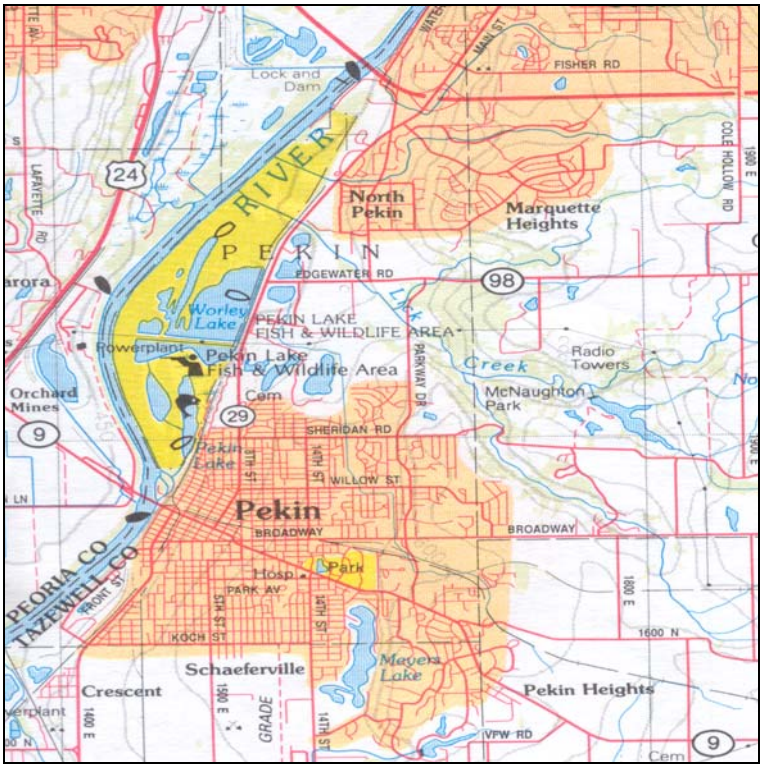


**Figure 1-1. Pekin Lake State Fish & Wildlife Area.**

The fact that the IDNR manages the entire site in a separate manner with distinct ecosystem goals for the Northern and Southern Units makes clear the need for separate feasibility level documents pertaining to each unit individually. Further, the habitat needs of the site are distinctly different from north to south and therefore reinforce this view.

## 1.5 ELIGIBILITY CRITERIA

The project eligibility for inclusion as a critical restoration project is based on whether the restoration project addresses the ecosystem restoration vision and goals identified in the Initial Assessment for Illinois River Basin Restoration. The ecosystem restoration goals are as follows:

- Reduce sediment delivery from upland areas and tributaries to the Illinois River,
- Selectively remove sediment, reduce sediment deposition, and improve sediment characteristics in backwater and side channels,
- Restore floodplain habitat and function,
- Increase connectivity of aquatic and terrestrial habitats,
- Naturalize hydrologic regimes in tributaries and the mainstem of the Illinois River,
- Restore natural disturbance regimes,
- Protect high quality and restore degraded native ecosystems and habitats,
- Maintain viable populations of native species, and
- Improve water quality.

The Pekin Lake SFWA - Northern Unit project is consistent with the ecosystem restoration goals of selectively removing sediment in backwater and side channel areas, restoring floodplain function, increasing connectivity of aquatic habitats, naturalizing hydrologic regimes on the mainstem, protecting high quality ecosystems and habitats, and maintaining viable populations of native species.

The authorizing legislation, Section 519 of the Water Resources Development Act, paragraph (c)(1), identified the following minimum eligibility criteria for the Critical Restoration Projects: "If…a restoration project for the Illinois River Basin will produce independent, immediate and substantial restoration, preservation and protection benefits, the Secretary shall proceed expeditiously with the implementation of the project." Consistency with these criteria are reviewed in Section 2 - Evaluate and Compare Alternative Plans.

## 1.6 SELECTION PROCESS

In the fall of 2000, the IDNR prioritized Illinois River Basin watersheds. The process identified high quality watersheds that are threatened with degradation, where there is high potential for restoration, and public ownership or willing landowners. The following six watersheds/areas were selected for the initial site-specific projects: Blackberry Creek,

Waubonsie Creek, Iroquois River, Kankakee River near Aroma Park, Pekin Lake, and McKee Creek.

The study team reviewed available literature, met with local agencies and partnerships, and visited the areas to further define problems and opportunities and initiate feasibility level evaluations for restoration activities in the watershed that met the ecosystem restoration goals described above. Eligibility requirements and the project selection process will be further developed as part of the Illinois River Ecosystem Study, and Illinois River Basin Restoration and will be described in the Illinois River Comprehensive Plan.

## 1.7 BACKGROUND AND HISTORY

The Illinois River has long been an important environmental and economic resource. This importance led Congress to recognize the Illinois River as part of the Upper Mississippi River System as a unique, nationally significant ecosystem and a nationally significant commercial navigation system in Section 1103 of the WRDA of 1986 (WRDA 86).

The State of Illinois recognizes the important resource that the Illinois River represents. The Offices of the Governor and Lieutenant Governor have led efforts to focus attention on the Illinois River, including completing the *Integrated Management Plan for the Illinois River Watershed* and proposing Illinois Rivers 2020, a $2.5 billion, 20-year State and Federal initiative to restore the Illinois River. Local groups along the river basin have been very active in pursuing river restoration. In the Peoria area, the Peoria Lakes Basin Alliance is working to develop a common vision for future restoration and to increase public awareness of problems.

The National Research Council considers large floodplain-river ecosystems to be the highest priority for aquatic restoration and identified the Illinois River as one of three of these ecosystems in the United States with sufficient ecological integrity to recover. At the turn of the century, the Illinois River Valley was famous for its hunting and fishing areas, supporting over 2,000 commercial operations. Islands, backwaters, side channels, lakes, and bottomland forests allowed fish and game to flourish. In fact, in 1908, the U.S. Department of Commerce and Labor reported that the Illinois River provided 10% of all freshwater fish caught in the United States (Talkington 1991). The Illinois Valley also has international significance as a part of the Mississippi Flyway, a major migration route for hundreds of thousands of waterfowl, shorebirds, and neotropical migrants.

The Illinois River Ecosystem Restoration Feasibility Study is a 3-1/2 year, $5.24 million effort being conducted under the authority of Section 216 of the Flood Control Act of 1970 in partnership with the State of Illinois Department of Natural Resources initiated in 2000. The study will identify the Federal and State interest in addressing problems within the entire Illinois River Watershed. System problems and a draft set of goals and objectives have been developed through numerous meetings with agency representatives, local sponsors, and other stakeholders. The principal habitat problems in the Illinois River Basin are the result of sedimentation of backwaters and side channels, degradation of tributary streams, water level fluctuations, loss of floodplain and tributary connectivity,

and other adverse impacts caused by human activities. Two efforts are currently underway in the study: (1) a system evaluation focused on assessing overall watershed needs and general locations for restoration, and (2) identification and assessment of site-specific projects.

A number of evaluations to develop detailed project plans for specific sites are underway. At the request of the State, the Corps has initiated assessments for seven site-specific projects in the basin. The seven site-specific investigations are Iroquois River, McKee Creek, Kankakee River - Mainstem, Pekin Lake SFWA - Northern Unit, Pekin Lake SFWA - Southern Unit, Waubonsie Creek, and Blackberry Creek.

Unstable hydrologic regimes at Pekin Lake SFWA - Northern Unit limit the productivity of existing moist soil and emergent habitats there. The *Habitat Needs Assessment*, completed as part of the Upper Mississippi River System - Environmental Management Program in 2000, found that the most critical need along the Illinois River was the restoration of backwater lakes and side channels to increase depth diversity. This report called for the restoration of hydrologic conditions needed to restore and maintain existing backwater habitat.

Concurrent to the development and initiation of the Ecosystem Study, the IDNR initiated development of a *Pekin Lake State Fish and Wildlife Area Draft Preliminary Restoration Plan*. This document established site goals and management objectives to be obtained through restoration at the site. The management objective for the site is:

- To maintain and enhance the existing natural heritage and wildlife resource integrity of the site with emphasis on waterfowl management, protecting the heron rookery and other sensitive avian species, and maintaining the site's value as a fish nursery to the La Grange Pool of the Illinois River.

The document also relates the site's long history of use and natural resources. This information provided the Corps and sponsor with clear justification, consistent with critical restoration authorizing language and eligibility criteria defined above, to select the site for further investigation.

## 1.8 DISCUSSION OF STUDIES, REPORTS, AND EXISTING WATER PROJECTS

### 1.8.1 Prior Studies and Reports

In conducting this analysis, a number of documents were consulted, which included:

- ***Pekin Lake State Fish and Wildlife Area – Management Plan***, 2001, Illinois Department of Natural Resources. The site management plan summarizes the site history, significant resources, and makes recommendations for future management of the site.

- ***Soldwedel and Worley Lakes: Topographic Features and Preliminary Sediment Characteristics***, February 2001, James A. Slowikoski and Nani Bhowmik, Illinois State Water Survey. This letter report provides a brief overview of topographic features and sediment characterizations for the Soldwedel and Worley Lakes.

- ***Ground-Water Conditions in the Vicinity of Soldwedel and Worley Lakes***, February 2001, Stephen Burch, Illinois State Water Survey. This letter report summarizes ground water conditions near Pekin, Illinois, and addresses connectivity of the lakes with the river.

- ***Vegetative Sampling,*** 2001, Upper Midwest Environmental Science Center, http://www.umesc.usgs.gov/data_library/data_library.html, Upper Mississippi River Environmental Management Program - Long Term Resource Monitoring Program (LTRMP). Staff at the Illinois River Biological Station (IRBS) has monitored submersed aquatic vegetation at Pekin Lake SFWA yearly from 1998 through 2001 using standardized protocols through the LTRMP.

- ***Dredged Material Management Plan for Dredged Material Placement: Illinois Waterway Navigation Project, Site Plan for the Lick Creek/Peoria Lock Lower Dredge Cuts, River Miles 154.0-157.7***, August 1996, U.S. Army Corps of Engineers, Rock Island District. This document records the process used to develop a Dredged Material Management Plan (DMMP) by evaluating the potential alternative placement locations for dredged materials in this reach.

- ***(Pekin Lake Conservation Area - Water Flow Balance Proposal,*** June 1986, Illinois Association of Duck & Goose Hunters. The proposal calls for an 18-inch or 24-inch water supply line from the upstream side of Peoria Lock and Dam and a discharge structure with drop logs.

### 1.8.2 Existing Water Projects at Pekin Lake SFWA

Significant actions include:

- **Existing Corps of Engineers Activities in the Vicinity of the Pekin Lake SFWA.** There are no existing Corps of Engineers activities at Pekin Lake SFWA, but activities in the area include the operation of Peoria Lock and Dam and dredging of a recurring shoaling area in the navigation channel.

  Peoria Lock and Dam is located at River Mile (RM) 157.7 near the city of Peoria, Illinois. This facility, constructed in 1938, has a lock with a usable chamber 110 feet wide and 600 feet long with a flat pool lift of 11 feet. The dam is constructed of wicket gates that can be lowered during higher flows, allowing tows to transit the area without locking through the chamber. Open river conditions, wickets lowered, typically occur 38% of the year. At other times, the dam is operated to maintain a pool elevation of 440 feet NGVD upstream of the lock and dam. River levels downstream are influenced by flows at the Peoria Lock and Dam, the Mackinaw River which comes

into the Illinois River at RM 147.7 and the La Grange Lock and Dam at RM 80.2. The La Grange Lock and Dam has a similar design and operation to the Peoria Lock and Dam and its influence on river water levels progresses farther upstream as river flows decrease.

Shoaling in the navigation channel regularly occurs from RM 154.0-157.7. Since 1940, the dredge cuts have required dredging a combined 21 times, removing 1,229,127 cubic yards of dredged material, to provide a safe and unobstructed navigation channel.

- **Existing Federal Activities at Pekin Lake SFWA.** The Upper Mississippi River Environmental Management Program (EMP) - Long Term Resource Monitoring Program (LTRMP) monitors fish and vegetation at Pekin Lake SFWA. There are no other Federal activities at the site.

- **Partnerships and Ongoing Water Resource Projects and Programs.** The IDNR owns and manages Pekin Lake SFWA as a State of Illinois Fish and Wildlife Area.

  The City of Pekin, Illinois, sought and received a $150,000 state grant to conduct restoration at Pekin Lake SFWA. This grant has not been utilized and represents a potential non-Federal funding source for restoration in the area.

Section 2

# Plan Formulation

## 2.1 DESCRIPTION OF THE STUDY PROCESS

Development of the Pekin Lake SFWA - Northern Unit Feasibility Study followed the Corps of Engineers' six-step planning process specified in Engineering Regulation (ER) 1105-2-100. The process identifies and responds to problems and opportunities associated with the Federal objective and specified state and local concerns. The process provides a flexible, systematic, and rational framework to make determinations and decisions at each step so that the interested public and decision makers are fully aware of the basic assumptions employed; the data and information analyzed; the areas of risk and uncertainty; and the significant implications of each alternative plan. If a Federal and State interest is identified, the process culminates in the selection of a plan to be recommended to Congress for implementation.

As part of identifying the selected plan, a number of alternative plans are developed and compared with the "no action alternative," allowing for the ultimate identification of the National Ecosystem Restoration (NER) Plan. The NER Plan reasonably maximizes ecosystem restoration benefits compared to costs, considering the cost effectiveness and incremental cost of implementing other restoration options. In addition to considering the system benefits and costs, it will also consider information that cannot be quantified such as environmental significance and scarcity, socioeconomic impacts, and historic properties information.

The steps used in the plan formulation process include:

1. Identify Problems and Opportunities: The specific problems and opportunities are identified, and the causes of the problems discussed and documented. Planning goals are set, objectives established, and constraints identified.

2. Inventory and Forecast Resource Conditions: This characterizes and assesses conditions in Pekin Lake SFWA - Northern Unit as it currently exists and forecasts the most probable without-project condition (or "no action alternative") over the period of analysis. This assessment gives the basis by which to compare various alternative plans and their impacts. The without-project condition is what the lake and its uses are anticipated to be like over the 50-year planning period without any restoration implemented as a result of this study. The with-project condition is what the lake and its uses are anticipated to be if restoration measures are implemented.

3. Formulate Alternative Plans: Alternative plans are developed in a systematic manner to ensure that reasonable alternatives are evaluated. In addition to the "no action alternative," restoration alternatives in the lakes will be considered.

4. Evaluate Alternative Plans: The evaluation of each alternative consists of measuring or estimating the environmental benefits (Habitat Units), costs, technical considerations, and social effects of each plan, and determining the difference between the without and with-project conditions. A key measure for evaluation of alternative plans is a cost-effectiveness incremental cost analysis and evaluation of significance.

5. Compare Alternative Plans: Alternative plans are compared, focusing on the differences among the plans identified in the evaluation phase and public comment. As part of the evaluations, the "best buy" plans are identified—those plans that provide the greatest increase in benefits for the least increase in cost.

6. Select Recommended Plan: A Recommended Plan is selected and justified for plan selection. If a viable plan is not identified, the recommended plan will be the "no action alternative." In most cases, the NER plan will be selected from among the best buy plans.

The following sections are outlined in accordance with report content guidance in ER 1105-2-100 and therefore do not follow exactly the planning steps as they occurred. Further, the planning process is iterative. As such, as additional information was learned in subsequent steps, it was necessary to revisit and repeat portions of the previous step(s).

## 2.2 ASSESSMENT OF PROBLEMS AND RESOURCE CONDITIONS

The Illinois River Basin has long been an important environmental and economic resource. This importance led Congress to recognize the Illinois River as part of the Upper Mississippi River System as a unique nationally significant ecosystem and a nationally significant commercial navigation system in Section 1103 of WRDA 1986. The National Research Council recognizes the Illinois River as a nationally significant floodplain river with excellent prospects for restoration.

The State of Illinois also recognizes the important resource that the Illinois River Basin represents. The Offices of the Governor and Lt. Governor have led efforts to focus attention on the Illinois River, including completing an *Integrated Management Plan for the Illinois River Watershed* and proposing "Illinois Rivers 2020"—a $2.5 billion, 20-year State and Federal initiative to restore the Illinois River. Local groups within the river basin have been active in pursuing restoration. The State of Illinois has committed itself to restoration activities in the basin by leading planning efforts and enacting legislation aimed at basin restoration. The State has supported restoration efforts through the most successful Conservation Reserve Enhancement Program in the Nation and numerous locally led watershed-planning initiatives. In addition, local groups strongly support and have been active in pursuing restoration in the basin.

### 2.2.1 Existing Conditions

The Pekin Lake SFWA is located adjacent to the city of Pekin, Illinois, and consists of six former and current bodies of water separated by moist soil plant communities and bottomland timber. Sediment deposited over the years has filled the former lake basins, making most of these water areas dry or too shallow to sustain fish during normal dry season/low water period pool levels in the Illinois River. The lakes and their former sizes were:

**Northern Unit**
Worley Lake, 258 acres
Slim Lake, 57 acres
Round Lake, 16 acres
Little Round Pond, 4 acres

**Southern Unit**
Soldwedel Lake, 105 acres (old Pekin Lake)
Lake of the Woods, 108 acres

These lake basin areas, with the exception of Round Lake and Little Round Pond, are all connected by channels, or culverts, through man-made levees and causeways. The connecting channel to the Illinois River is located at the south end of Soldwedel Lake, near the Illinois Route 9 road bridge. The only water control structure at the site is a nonfunctioning, east-west levee (IDNR levee) that was constructed many years ago to retain water in Worley Lake, Upper Lake of the Woods, Round Pond, and Slim Lake for the purpose of waterfowl hunting. A causeway was constructed in 1965 approximately 600 feet north of the levee to provide access and footings for a CILCO electric transmission towers and overhead lines. There are several culverts through the causeway, and the causeway does not function efficiently to retain water (see Figure 2-1).

For many years, a low-level dam was maintained at the south end of Soldwedel Lake to retain water for ice cutting operations. Ice was cut from the lake and sold commercially. In 1938, the Peoria Lock and Dam was completed, replacing the dam at Copperas Creek. This resulted in a lower pool elevation in the Illinois River adjacent to Pekin Lake SFWA.

The Forest Park Foundation purchased the Pekin Lake property and sold it to the state in 1966. The land was purchased for open space, as a wildlife sanctuary, and to preserve the heron rookery. The state has since purchased other small tracts. Biological studies of the area have been conducted since 1962, including annual monitoring of the heron rookery.

Current management of Pekin Lake SFWA is passive. During periods of high water, boats can enter Pekin Lake SFWA at the south end from the Illinois River. Other uses include bank fishing, hiking, picnicking, waterfowl hunting, archery deer hunting, and wildlife observation. The Northern Unit of the Pekin Lake SFWA is defined as the area directly north (upstream) of and including the CILCO Causeway and south of Lick Creek. This Unit is bounded on the west by the Illinois Waterway and to the east by an active railroad corridor. The Southern Unit of Pekin Lake SFWA is defined as the area directly south (downstream) of, but not including, the CILCO Causeway and north of Coopers Island (Figure 2-2).

**Figure 2-1. CILCO Causeway looking West.**

**Figure 2-2. Pekin Lake Fish & Wildlife Area looking downstream (Worley Lake in the foreground).**

#### 2.2.1.1 Hydraulics

The hydrologic conditions in the Pekin Lake SFWA project area are essentially determined by the Illinois River water level. River water enters the lakes through a connection at the southern end of the site when river water surface elevations exceed the high-point channel bottom elevation of 431 feet. It also enters the lakes via overland flood flow when it exceeds approximately 440 feet. Lick Creek once fed the lakes in this area, but at some point since 1904, the creek was channelized to flow directly into the Illinois River, and so very little area now contributes runoff directly to the lakes within the Pekin Lake SFWA. Geotechnical investigations have confirmed that the lake bottom is composed of at least 10 feet of clay material. It is therefore highly likely that the Northern Unit would hold water if a levee was built. Regional groundwater discharges into the Illinois River and the project area may intercept some of this groundwater flow. The other source of water to the site is direct precipitation.

Sediment-bearing upland runoff is not a concern, and any groundwater or precipitation contributions would have little sediment. When water levels in the Illinois River are lower than approximately 440 feet, river inflows occur only through the constricted entrance at the south end of the site; river water would tend to back up through this constriction, reducing flow velocities and drawing water from the edge of the river instead of the high sediment-load flows in the main channel. When the river exceeds the bank-full level of approximately 440 feet, flood flows enter the site, contributing both sediment and water, and the effects of the constricted outlet no longer protect the site from sediment loading. It should be noted that the high-flow periods during which the river would have the most connection to the site are also the times of high sediment concentration, so despite the fact that the site is better off than some backwater lakes, it still receives a significant sediment load from the river.

Because the site is located between the Peoria Lock and Dam and the Kingston Mines gage on the Illinois River, it is possible to construct a hypothetical gage record of the water levels at the site outlet. Figure 2-3 shows the median annual hydrograph for 62 years of Illinois River water level records. Also shown are the 90% and 10% exceedance water levels, which correspond to the 10-year low- and high-water levels, respectively. This figure shows that the site is generally flooded from late March through late May, but that there is at least a 10% chance that it will be flooded on any day of the year except from late July until the autumn. The average annual high water level is 446.8 feet NGVD, and the 90% and 10% exceedances are 442.7 and 452.1 feet NGVD, so the site can be expected to flood even during the 10-year low-flow year. The corresponding low-water levels are 430.5, 429.8, and 431.2 feet NGVD, so the site draws down nearly every year until the surface water connection to the river goes dry.

Although this water regime currently maintains the site, historic water levels may have been higher due to control of the Illinois River and changes on the site. The construction of Copperas Creek dam elevated river water levels at the site from the time it was constructed in the late 1870's until it was removed in 1936. The current dams at La Grange and Peoria maintain lower water levels in this area because the site is in the

extreme upstream end of the La Grange pool and the effects of the dam are generally small relative to the effects of the Copperas Creek dam, which was only 16 miles downstream. The dam constructed across the outlet to benefit ice production in Pekin Lake SFWA, in combination with flows from an undiverted Lick Creek and higher river water levels, probably maintained higher water levels on the site at the turn of the 20th century. The dam across the outlet is nonexistent, and the water regime is no longer affected by Lick Creek flows.

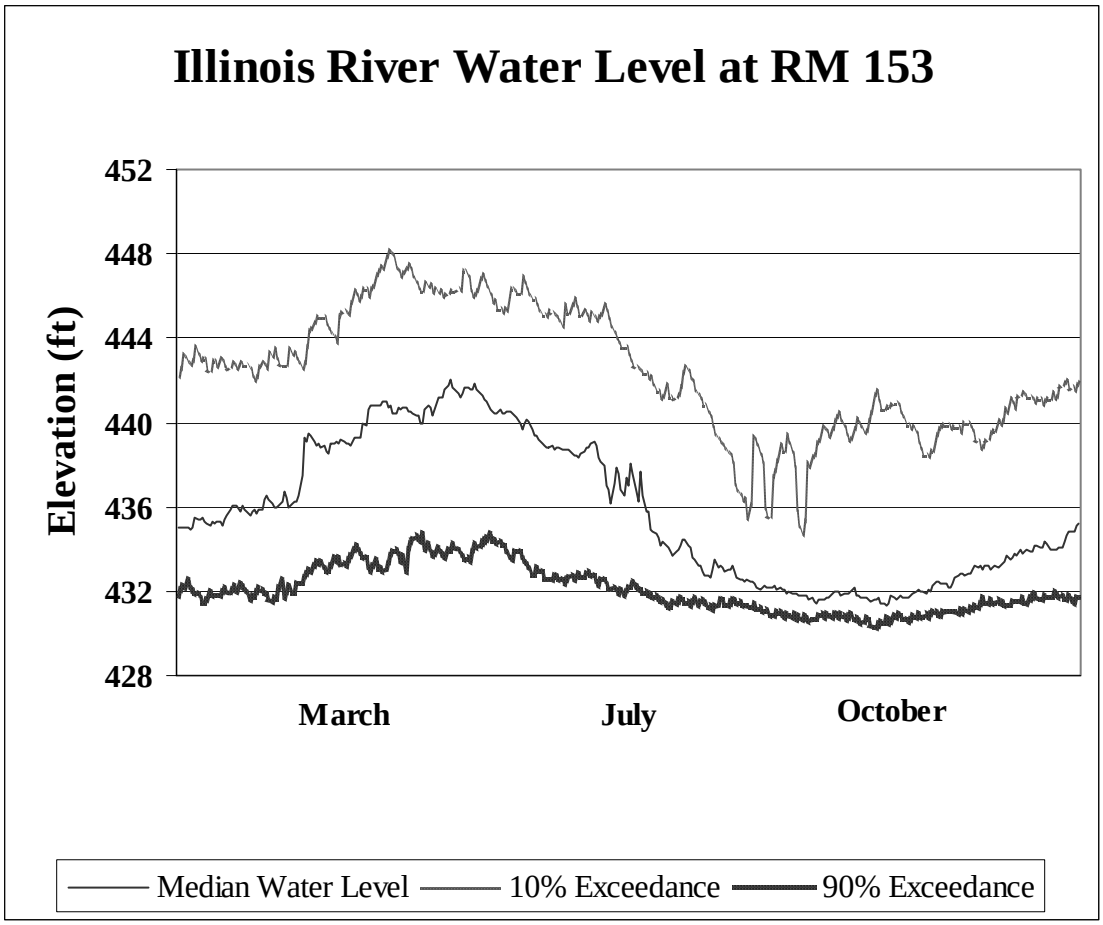


**Figure 2-3. Median annual hydrograph for Illinois River Mile 153.**

### 2.2.1.2 Environmental Resources

For much of the 20th century, water quality was in decline on the Illinois Waterway. A combination of changing agricultural practices, urbanization and industrialization along the river, and the opening of the Chicago Sanitary and Ship Canal all combined to increase sedimentation and industrial/chemical pollution on the Illinois Waterway. The increase in chemical pollution resulted in a decline of water quality in the upper reaches of the river that virtually wiped out fisheries or caused them to seek other, more agreeable habitat. Of the fish that were found, many had lesions or cancerous tumors

and/or were species more tolerant of the extremely poor habitat conditions. This situation soon created pollution problems that adversely impacted fisheries downstream as well (report of the LTRM).

Mussels in the river fared no better. In the late 1800's up to the turn of the century, the Illinois River supported at least 49 mussel species and was renowned as the most productive mussel stream (per river mile) in the country. A comprehensive mussel survey on the Illinois River, conducted from 1966-69 by Starrett, found that over one-half of the unionid species once found in the Illinois River had been extirpated. Starrett attributed this decline and elimination of numerous mussel species to intense commercial harvesting, degraded water quality from various forms of pollution, and widespread degradation and destruction of mussel habitat (Whitney et al. 1997).

With the establishment of the Environmental Protection Agency and the passage of the Clean Water Act, the situation regarding chemical pollutants began to reverse. It has taken many years, but improved water quality on the river concerning pollution has begun to be noticed, along with a return of some aquatic resources. More recent mussel surveys of Whitney, Blodgett, and Sparks conducted in 1993-95 found that while species richness was still in decline in Alton, La Grange, and Peoria reaches, there was significant improvement in the Starved Rock and Marseilles reaches. In fact, some mussel species that had been eliminated from the upper reaches are starting to make a return (Whitney et al. 1997). Additionally, fish surveys in recent years have shown healthier fish (no lesions or cancerous tumors) and increased species diversity for several reaches of the Illinois Waterway (report of the LTRM).

While chemical and industrial pollution is being brought under control, sedimentation is still a major issue on the Illinois Waterway, and it has destroyed much of the formerly high quality fish and wildlife. The Habitat Needs Assessment conducted as part of the Upper Mississippi River - Environmental Management Program found that the most critical need along the Illinois River was the restoration of backwater lakes and side channels to increase depth diversity. This report called for the restoration of backwaters on the Illinois River so that 25% of the backwater lakes (19,000 acres) would have an average depth of at least 6 feet.

#### 2.2.1.3 Fishery Resources

Pekin Lake SFWA currently provides spawning and nursery habitat for Illinois River fishes. High river stages during spring provide fish access to off channel spawning sites. As spring floods subside, the fish produced in Pekin Lake SFWA are drained back into the La Grange Pool of the Illinois River. This recruitment of fish is a critical fishery function of the site and is essential to the aquatic health and vitality of the Illinois River. Any proposed water management structures at Pekin Lake SFWA should be designed in such a way that the fishery nursery function can be maintained.

The staff at the Illinois River Biological Station (IRBS) has been collecting fish data from the Pekin Lake SFWA since 1995. Boat access to Pekin Lake SFWA is limited

throughout much of the year due to low water levels. However, 5,470 fish including 32 taxa have been collected using mainly fyke, minnow fyke, and electrofishing gears since 1995. The top five most abundant species collected over the period of record were gizzard shad (*Dorosoma cepedianum),* white bass (*Morone chrysops),* Common carp (*Cyprinus carpio),* emerald shiner (*Notropis atherinoides),* and black bullhead (*Ameiurus melas).* In addition to fish, one common snapping turtle (*Chelydra serpentina)* and one red-eared slider (*Chrysemys scripta)* were also collected at Soldwedel Lake (Personal Com. Mark Pegg, INHS and LTRMP Website).

#### 2.2.1.4 Forest Resources

Floodplain forests within the Pekin Lake SFWA occupy approximately 633 acres and consist of tree species typical of a seasonally flooded river bottom. Cottonwood (*Populus deltoides*), silver maple (*Acer saccharinum*), green ash (*Fraxinus pennsylvanica*), black willow (*Salix nigra*), and boxelder (*Acer negundo*) constitute the most prevalent tree species at Pekin Lake SFWA. The hydrologic regime of the Illinois River has probably been the single largest factor in determining the forest condition at Pekin Lake SFWA, though historic logging, fire suppression, and disruption of other disturbance regimes have influenced forest structure.

The three soil types present are Jules silt loam, Lawson silt loam, and Landes fine sandy loam. These soils are listed in the *Soil Survey* as being frequently flooded, except Jules, which is listed as occasionally flooded. There is some likelihood that other bottomland hardwood species such as hackberry (*Celtis occidentalis*), pecan (*Carya illinoensis*), pin oak (*Quercus palustris*), shingle oak (*Quercus imbricaria*), bur oak (*Quercus macrocarpa*), and black walnut (*Juglans nigra*) may have occurred in this area (especially in the higher and drier sites) in the past but may have been eliminated by cutting and changes in hydrology.

Water depth is important not only for foraging habitat but also for maintaining the heron rookery trees. Prolonged annual floods are already causing tree mortality in the rookery. Therefore, water should never be deliberately held so high as to flood the bottomland forest at Pekin Lake SFWA, as this would increase the high water stress on rookery trees.

#### 2.2.1.5 Waterfowl

In years of low river levels throughout the summer, the area provides very important pasture for Canada geese. This area also provides important brood habitat for mallards, wood duck, and Canada geese.

The area was opened to public waterfowl hunting in 1979. Currently, 12 blinds are allocated by an annual draw and hunted in compliance with statewide regulations. The blinds are located on Lower and Upper Lake of the Woods and on Slim Lake. The remaining areas of Pekin Lake SFWA (south of Lick Creek), including Lower Lake of the Woods, Soldwedel Lake, and Worley Lake, are managed as a refuge with no entry

between 7 days prior to the opening of the regular waterfowl season through the close of the waterfowl season (including the late goose season).

Waterfowl usage of the site is recorded in periodic aerial inventory data collected by the Illinois State Water Survey. Inventories include information on numbers of individuals of various species of ducks and geese as well as some information on bald eagles and double-crested cormorants. Most flights were on a weekly basis when the weather permitted: fall (September-December): weekly 1949-1956, 1964-1966, 1971-2000 and spring (February-April): 1956, 1958, 1960, 1961, 1974, 1976-1985, 1987, 1990-2001.

#### 2.2.1.6 Shorebirds

During low-water periods, large numbers of shorebirds feed in shallow water and exposed mud flats at Pekin Lake SFWA during their spring and especially fall migrations. Different species migrate at different times, but overall the spring migration is from mid-March through June, and the fall migration is from early July through early November.

All shorebirds consume invertebrates, but different shorebird species prefer different foraging water depth and vegetation height and density conditions. A range of habitats is needed to support a diverse species assemblage. Variations in elevation at Pekin Lake SFWA allow a variety of foraging conditions at the same time. Due to high shorebird use and high quality habitats, an application has been made to the American Bird Conservancy nominating the area as a Nationally Important Bird Area.

#### 2.2.1.7 Wading Birds

Large numbers of wading birds (herons, egrets, and night herons) nest and feed in the Pekin Lake SFWA area. This is consistently one of the largest rookeries on the Illinois River and has been active since at least 1935, except from 1973-1985 when logging caused rookery abandonment.

Wading birds forage in Pekin Lake SFWA throughout much of the year, except during floods or when the lake is frozen. These birds feed primarily on fish, but also on frogs, insects, crayfish, and small vertebrates. Great blue herons and great egrets require water depths between a few inches and 2 to 3 feet deep for foraging. Black-crowned night herons are smaller and forage in water less than 6 inches deep. High water not only eliminates foraging areas, but also results in dispersal of fish over a larger body of water, which compromises the quality of foraging habitat.

Each wading bird species has somewhat different timing, but in general, they arrive in February and March, lay eggs from March to June, and the nestlings develop and fledge between June and August. The most critical time to provide adequate water depths for these birds is during nesting and fledging.

#### 2.2.1.8 Aquatic Vegetation

Staff at the Illinois River Biological Station (IRBS) began monitoring submerged aquatic vegetation within La Grange Pool of the Illinois River in 1991. The Pekin Lake SFWA was not included in this sampling until 1998 when a stratified random sampling (SRS) design was implemented. Sampling within Pekin Lake SFWA has taken place yearly from 1998 through 2001. No submerged aquatic vegetation has been found within the Pekin Lake SFWA and surrounding area. Water depths taken during sampling varied depending on river stage from exposed mudflats to almost 13 feet. Substrate was dominated by silt and clay. Lack of submersed aquatic vegetation is probably due to a combination of biotic and abiotic factors, including water level fluctuation, increased sedimentation, and poor water quality, as well as uprooting and herbivory by fishes and waterfowl (Personal Com. Mark Pegg, INHS, and LTRMP website).

#### 2.2.1.9 Endangered Species

Two federally threatened species are known to be located in the Pekin Lake SFWA. While Tazewell County is listed as "wintering" habitat for the threatened bald eagle (*Haliaeetus leucocephalus*), there is a known eagle nest along the river near the downstream end of the wildlife area. The decurrent false aster (*Boltonia decurrens*) is a federally threatened floodplain species found within the upper end of the Pekin Lake SFWA. Two species of this plant were also found along the CILCO levee during a survey by the IDNR in 2000. The State endangered black-crowned night heron (*Nycticorax nycticorax*) can also be found nesting within the historic heron rookery northwest of Worley Lake.

#### 2.2.1.10 Invasive and Exotic Species

The main problems present are cockleburs and willow invasion in some of the water areas such as Slim Lake. Reed canary grass is not much of a problem yet, but should be monitored closely. Purple loosestrife had not been found on the site as of the summer of 2000. However, it is found along the river just northwest of Pekin Lake SFWA, so it is only a matter of time before it occurs. The area should be monitored closely for purple loosestrife. All of the above species will require monitoring and control measures, which will include drawdowns, flooding, disking, spraying, mowing, and herbicide.

#### 2.2.1.11 Wetland Mitigation

The City of East Peoria constructed a wetland in the abandoned agricultural field south of Lick Creek in 1992. The 23.35-acre wetland was constructed in response to a regulatory action by the Rock Island District, U.S. Army Corps of Engineers to mitigate filling of 16.9 acres of wetlands adjacent to Lower Peoria Lake. The wetland is primarily a seasonally flooded emergent wetland and wetland meadow, with the remainder a shrub/forest border or transition zone.

#### 2.2.1.12 Public Use

The site currently provides numerous recreational opportunities, including fishing, waterfowl hunting, bow hunting, picnicking, canoeing, small pleasure boating, hiking, and wildlife observation. Site use estimates included over 550 hunting trips during the 1999-2000 season, but this number may significantly understate actual usage since the site is not staffed and sign-ins are voluntary.

#### 2.2.1.13 Historic Properties

Initial investigations into cultural resource potential did not reveal any known historic sites and generally indicates low potential.

### 2.2.2 Future Without-Project Conditions

Sedimentation has historically reduced, and is likely to continue to reduce, the depth of backwater lakes and side channels, deteriorating the natural aquatic resources. Even if relative equilibrium is being established in terms of sediment deposition, it remains very unlikely that the existing degraded habitats would see measurable improvements in the near future. With respect to the expected future environmental condition of Pekin Lake SFWA, ongoing water level fluctuations and sedimentation will likely result in continued limitations or potential further decline in populations of fish and wildlife.

In preparation for the habitat analysis, a baseline without-project condition was developed for the Northern and Southern Units of the project. These serve as the base conditions from which to measure benefits of various project alternatives. They are also useful in putting a number against anticipated future without-project conditions.

In the Northern Unit of the Pekin Lake SFWA, the management goals are to maximize and improve reliability of moist soil plant production areas. Cover types evaluated include shallow water, moist soil/emergent, scrub shrub, and forested (see Table 2-1). Over the 50-year life of the project, if nothing is done, significant succession (conversion) of habitats is anticipated to occur, resulting in the loss of the more desirable shallow water and moist soil communities to scrub-shrub due to willow invasion and sedimentation. The analysis projected significant losses (approximately 30%) of the moist soil and emergent cover types necessary for healthy moist soil plant production. Further, the shallow water feeding areas that support the heron rookery will decline by approximately 40%. Finally, the scrub-shrub and forested areas will grow in proportion to the losses seen for moist soil/emergent and shallow water. The Northern Unit is already predominantly forested and the willow dominated scrub-shrub cover types have marginal habitat value in relation to what is being lost in moist soil plant production.

**Table 2-1. Northern Unit without-project conditions.**

| Northern Unit Baseline Habitat Conditions | | Without-Project Acres by Target Year | | | | |
|---|---|---|---|---|---|---|
| **Cover Types** | **Description** | **0** | **1** | **5** | **20** | **50.0** |
| *Deep* | **Deep water = or > 4 ft in depth** | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** |
| *Shallow* | **Shallow open water** | **29.2** | **28.8** | **27.0** | **21.4** | **12.1** |
| *Moist/Emergent* | **Combination of moist soil, mud flat, and emergent cover types** | **218.4** | **215.6** | **204.4** | **167.1** | **103.7** |
| *Scrub-Shrub* | **Scrub shrub areas that are invading the moist emergent areas, predominantly willows.** | **130.1** | **131.4** | **136.5** | **15.7** | **157.9** |
| *Forested* | **Forested areas, including forested wetland and bottomland hardwood** | **304.2** | **306.2** | **314.0** | **342.7** | **408.3** |
| | | **681.9** | **681.9** | **681.9** | **681.9** | **681.9** |

### 2.2.3 Problems and Opportunities

The principal problems at Pekin Lake SFWA - Northern Unit are altered hydrologic regimes, sedimentation, the loss of moist soil plant communities and foraging areas for herons due to sedimentation and willow invasion, resulting in reduced habitat value and biodiversity. These impacts have been experienced and are likely to be more pronounced as continued inputs of sediment and willow encroachment replace quality habitats. Backwater lakes and side channels along the Illinois River formerly provided a great variety of high quality habitat types with greater depth diversity. These areas formerly provided large areas of deep and shallow water habitat, numerous sloughs, and forested and non-forested wetland habitats. Pekin Lake SFWA - Northern Unit provides an excellent opportunity for restoration of many of these habitat types.

Opportunities listed below were used as the foundation for the development of alternatives to address the principal problems at Pekin Lake SFWA - Northern Unit:

- Preserve and maintain the existing natural heritage and wildlife resource integrity of the site with emphasis on waterfowl management, protect the heron rookery and other sensitive avian species, and maintain the site's value as a fish nursery to the La Grange and Peoria Pools of the Illinois River.

- Restore habitat and species lost from much of the Illinois River Valley, including, aquatic plants, mast trees, invertebrates, and off-channel overwintering habitat for fish.

### 2.2.4 Goals and Objectives

In consultation with the non-Federal sponsor and interested parties from the City of Pekin, goals and objectives were developed during the summer of 2001 and finalized at a meeting on December 6, 2001 (see Table 2-2).

**Table 2-2. Goals and objectives.**

**Project Goals, Objectives, and Potential Enhancement Features**

| Goal | Objective | Feature (proposed) |
|---|---|---|
| *Improve aquatic habitat* | Improve water quality – (ammonia and DO) | Maintain flow or some aeration through – siphon, pipeline from Peoria pool, bubbler, pump, riffles, or drop structures |
| *Enhance wetlands* | Improve migratory waterfowl and shorebird habitat | Establish a waterbird management area (improve moist soil plant production) |
| | Maintain and enhance heron feeding areas | Establish a waterbird management area (depths 2-3 feet and less) |
| | Increase the diversity and extent of aquatic vegetation | Decrease rapid water level fluctuation (lower and upper management areas) |
| | | Place a water control structure on the lower end of the site |
| *Improve terrestrial habitat* | Protect heron and egret rookery | Manage water levels to avoid impacts to rookery trees |
| | | Develop future rookery sites |

## 2.3 PLANNING CONSTRAINTS

The principal focus of this study is to identify opportunities for restoring degraded ecosystem structures and functions, taking into account the site's hydrology, plant, fish, and wildlife communities. Several constraints must be taken into account in developing alternatives to achieve the above focus.

- **Constraint #1 -** Avoid adverse impacts to the existing heron rookery. Minimize flooding in the heron rookery. Prohibit activity on or near the rookery from February through August to avoid disturbing nesting birds. Minimize disturbance to foraging wading birds, especially from February through August. Monitor the heron rookery annually. This constraint has been accounted for in the construction schedule and environmental impact detailed in the Environmental Assessment.

- **Constraint #2 -** Avoid impacts to *Boltonia decurrens* (decurrent false aster), a state and federally threatened plant that grows in several locations at Pekin Lake SFWA. Excessively high water should not be held deliberately in the Northern Unit of Pekin Lake SFWA (Worley Lake) during the summer and fall.

- **Constraint #3** - Any proposals that would involve modifications or potential effects on the CILCO power company central road will require coordination and CILCO agreement.

- **Constraint #4** - The powerline that crosses the site has the potential to adversely affect migratory waterfowl.

- **Constraint #5** - Willow and sediment material placement in the floodplain cannot significantly increase flood heights. Subsequent investigations into the flood height impacts of various alternatives showed no significant increase in flood heights.

- **Constraint #6 -** The per project cost limit for Federal ecosystem restoration projects is $5 million.

- **Constraint #7 -** Permanent wetland fills should be avoided, minimized, and compensated to comply with existing laws and regulations.

## 2.4 IDENTIFY MEASURES AND FORMULATE ALTERNATIVE PLANS

Before alternative plans were formulated, the first step taken was to identify general locations and categories of potential improvements that would satisfy the goals and objectives established previously. The process of developing final alternative plans occurred over 12 months, from June 2001 through May 2002. A Regional Team consisting of IDNR site managers, regional biologists, City of Pekin representatives, and Corps of Engineers personnel met monthly to formulate these alternatives. The process began with several discussions concerning the management goals and objectives in practice by the State of Illinois. This yielded an array of *general measures* from which *specific measures* were

developed. The formulation of these specific measures involved an assessment of the measures as to whether they met the goals and objectives of the study and how likely they were to produce measurable habitat benefits. Obviously, this is a subjective process requiring further trade off analysis and habitat evaluation procedures of alternative plans; however, the depth of professional experience and first-hand management knowledge by many members of the team was invaluable in defining specific measures.

Finally, during this process, several specific measures were screened for a variety of reasons. They are not included as specific measures but are described in the screening section below, along with necessary justification for their elimination from consideration. Upon finalization of specific measures, alternatives were developed through combination of specific measures. This development of *alternative plans* is described below.

### 2.4.1 General Measures and Criteria

As each potential category of measures was developed, a corresponding list of criteria related to each potential measure was developed. IDNR maintains a regional field office in Pekin and, as a result, local field staff expertise played a key role in development of the criteria. Further, IDNR has developed a management plan for the site that was used to guide criteria development and assist with development of specific measures. Below are listed the potential categories of actions, and corresponding criteria, to provide improved aquatic habitat, water level management, and improved terrestrial habitat.

#### 2.4.1.1 Cross Levees for Water Level Management

The reconnaissance study, 905(b) analysis, discussed the potential for water level management in the Northern portion of Pekin Lake SFWA for aquatic plant production and enhanced management of moist soil units in the area. This category of measures includes construction of new levees at various locations, repair and reinforcement of the existing breached IL IDNR levee, and repair and reinforcement of the existing CILCO Causeway. Criteria include:

*Biological*

- Desired management of water levels in the upper unit is approximately 70 days summer drawdown (Jul 1 - Oct 15) to 435.5 feet NGVD for aquatic plant production; gradual water level raise (Sep - Oct) to 437 feet NGVD; hold until spring for waterfowl.
- Avoid or reduce the occurrence of water level raises from the Illinois River; 2-3 days of inundation will kill moist soil plants.
- Provide foraging areas for great blue heron and egret up to 2 feet of depth.
- The desired water level management must protect the existing heron rookery trees. Trees generally survive if water levels throughout most of the year are 1-2 feet below root level.
- Future with-project conditions should support more diverse forest and new stands of mast trees.

*Engineering/Site*

- Cross levee height should match the natural riverside levee elevation due to estimated large cost increases to increase the natural riverside bankline height (approximately EL 443) with maximum spillway elevation at 441.
- Levees should have 3 feet of freeboard for safety.
- At high river stages (approximately EL 440 feet or above) it is not desirable to manage the Northern Unit by lowering water level elevations below river levels. However, it is acceptable for the Northern Unit to flood.
- At low river stages (<433) it is desirable to maintain and manage the Northern Unit at higher elevations (435-437) and reduce fluctuations caused by river level fluctuations (design to maintain 438).
- Design for potential complete drawdowns without the use of mechanical means during low river level periods.

### 2.4.1.2 Water Inflow Structures for Water Level Management

Successful water level management in the Northern Unit would benefit from a reliable source of water to maintain the desired water levels for aquatic plant production and resting areas for migratory waterfowl. This category includes pipeline options using Peoria Pool as a source, pumping stations from the Illinois River, groundwater well and pumps, and a closing structure or gate to trap natural high flows in the Northern Unit. Consideration was given to a pipeline from Peoria Lock and Dam, closing structures and gate, pump station, and a well. Criteria include:

- Desired filling time is between 14-30 days. This was determined to be approximately 5,000 gallons per minute.
- Design for potential complete drawdowns without the use of mechanical means during low river level periods.
- Design for minimal operation and maintenance (O&M) requirements.
- Minimize reliability and noise issues.
- Minimize disturbance to existing resources.
- Avoid heron rookery area.
- Pipeline should be buried for protection against UV light that would decay plastic pipe, vandalism, barrier to human and animal movement, freezing, and movement and damage during high water.

### 2.4.1.3 Rehabilitation and Sculpting

Slim Lake, Round Lake and other areas within the Pekin Lake SFWA are currently in the stages of transition from aquatic to terrestrial habitat. Willows and other less desirable terrestrial species are beginning to emerge. Options were explored to improve the viability of the shallow water aquatic habitat currently being lost. Excess material would be placed along adjacent shorelines. Part of the water level management goal

that has been established is the IDNR's desire to be able to draw down the water level of the Northern Unit. The benefits would include sediment compaction, moist soil plant production, and shorebird feeding areas. Therefore, some degree of sculpting is required so that as a draw down occurs, the drainage of water will be complete throughout the Northern Unit and result in no ponding of water. In other backwater areas of the Illinois River Valley, cases of botulism have occurred within poorly drained backwaters resulting in large fish and bird kills. Criteria include:

- Reconfigure Slim Lake and Round Lake to remove woody vegetation and prevent it from becoming established in the future. Increase depths approximately 1 foot to 18 inches to elevation 435.5 +/-.
- Removed sediments that are placed on the shoreline should not impact rookery areas. Placed material should be of sufficient height to support new rookery trees and minimize flood height impacts.
- Management objective is to be able to completely de-water Worley Lake during low river level conditions.
- Break up of wind fetch to reduce resuspension of sediments is desirable.

### 2.4.2 Specific Measures and Criteria

Reflecting the criteria outlined above and the constraints present at the project site, specific measures were developed within the broad categories of potential measures. These measures are intended to satisfy the objectives and reach the goals of the project study.

#### 2.4.2.1 Cross Levees for Water Level Management

- **P1** *Cross-levee Options* – Place material and a control structure to establish or raise existing structure to assist in water level management. These measures include a control structure for water level management. Spillway elevation would be at 441+/-.
    - **L1** *Reinforce/Raise and Modify CILCO Causeway* – Add material on top of the CILCO Causeway
    - **L2** *Reinforce/Raise Existing IDNR Levee* – Add material to and raise existing IDNR levee.
    - **L3** *Construct New Levee Upstream of CILCO Causeway* – New levee alignment upstream of CILCO Causeway.
    - **L4** *Construct New Levee Downstream of CILCO Causeway* – New levee alignment between CILCO Causeway and IDNR levee.
- **P2** *Raise Low Elevation Swale on Natural Levee* – Raise low spots to EL 443.0' +/- from the west end of any cross levee option, upstream along bankline. EL 440.0' is the estimated existing low swale elevation. Material would be used to raise this one location to EL 443.0'

#### 2.4.2.2 Water Inflow Structures

- **W1** *East Side Railroad Pipeline* – Run a pipeline from the southeast bank of the Illinois River above Peoria Lock and Dam along the railroad corridor to Worley Lake.
- **W2** *West Side Railroad Pipeline* – Run a pipeline from the northwest bank of the Illinois River above Peoria Lock and Dam along the railroad corridor to Worley Lake.
- **W3** *East Side Riverbank Pipeline* – Run a pipeline from the southeast bank of the Illinois River above Peoria Lock and Dam along the riverbank to Slim Lake.
- **W4** *West Side Riverbank Pipeline* – Run a pipeline from the northwest bank of the Illinois River above Peoria Lock and Dam along the riverbank to Slim Lake.
- **W5** *Natural Hydraulics* – Allow high water to fill Worley and Slim Lakes then close a structure (P1 Measures) so that high water level is maintained. The probability for filling to desired elevation (EL 438.0 +/-) under natural conditions is 1 in 3 years.
- **W6** *Pump Station* – Install a pump station near the Illinois River bankline adjacent to Worley and Slim Lake.
- **W7** *Well with Pump* – Construct groundwater well(s) and pump(s) on site.

#### 2.4.2.3 Rehabilitation and Sculpting

- **M1** *Rehabilitate Slim and Round Lakes* – Taking care to avoid the heron rookery, remove willows and remove sediment from Slim Lake. Depths would be to EL 435.5' +/-. Material would be placed along adjacent banklines and measures P1 and P2.
- **M2** *Sculpting for Drainage* – Sculpt Northern Unit submerged contours to allow for complete drainage of upper unit to eliminate ponding during drawdowns to approximate EL 432.0 +/-. Drawdowns will occur when conditions, determined by the site manager, for the outbreak of botulism are present.

**Table 2-3. Preliminary specific measures.**

| Category | Specific Measure | Symbol | Affected Unit | Study Goal |
|---|---|---|---|---|
| *Cross Levees for Water Level Management* | Cross Levee Options | **P1** | Southern | Improve Aquatic Habitat<br><br>Enhance Wetlands<br><br>Improve Terrestrial Habitat |
| | Reinforce/Raise and Modify CILCO Causeway | **P1L1** | | |
| | Reinforce/Raise Existing IDNR Levee | **P1L2** | | |
| | Construct New Levee Upstream of CILCO Causeway | **P1L3** | | |
| | Construct New Levee Downstream of CILCO Causeway | **P1L4** | | |
| | Raise Low Elevation Swale on Natural Levee | **P2** | | |
| | | | | |
| *Water Inflow Structures* | East Side Railroad Pipeline | **W1** | Northern | Improve Aquatic Habitat<br><br>Improve Water Level Management |
| | West Side Railroad Pipeline | **W2** | | |
| | East Side Riverbank Pipeline | **W3** | | |
| | West Side Riverbank Pipeline | **W4** | | |
| | Natural Hydraulics | **W5** | | |
| | Pump Station | **W6** | | |
| | Pump & Well | **W7** | | |
| | | | | |
| *Rehabilitation and Sculpting* | Rehabilitate Slim & Round Lake | **M1** | Northern | Improve Aquatic Habitat |
| | Sculpting for Drainage | **M2** | | |
| | | | | |

### 2.4.3 Initial Screening of Specific Measures

Some screening of measures is typical even prior to alternative plan development. Reasons for elimination of specific measures include excessive construction costs before real estate appraisals are made, inconsistency with goals or objectives, and inability to acquire land, easements, rights-of-way, relocation, and disposal (LERRD) areas. Further, continued clarification of goals and objectives concurrent with development of measures and lessons learned through previous cooperative study efforts with the IDNR would improve study efficiency. Table 2-4 details which alternatives were eliminated from further consideration and why.

**Table 2-4. Specific measures screened from further consideration.**

| Category | Specific Measure | Symbol | Justification for Elimination from Further Consideration |
|---|---|---|---|
| *Cross Levees for Water Level Management* | Reinforce/Raise Existing IDNR Levee | **P1L2** | Measure P1L1 is supported by CILCO and is the lowest cost option of the P1 Cross Levee Options. |
| | Construct New Levee Upstream of CILCO Causeway | **P1L3** | Measure P1L1 is supported by CILCO and is the lowest cost option of the P1 Cross Levee Options. |
| | Construct New Levee Downstream of CILCO Causeway | **P1L4** | Measure P1L1 is supported by CILCO and is the lowest cost option of the P1 Cross Levee Options. |
| | | | |
| *Water Inflow Structures* | Pipeline | **W1, W2, W3, W4** | Initial lowest cost estimate for these measures was $1,1281,500. Measure W7, Pump & Well, was estimated at $740,000. These measures provide the same function. Therefore, W7 was chosen as the preferred measure for delivery of water to the Northern Unit. Lifecycle costs are included in the estimate. |
| | Pump Station | **W6** | Initial cost estimate for this measure was $2,022,870. Measure W7, Pump & Well, was estimated at $740,000. These measures provide the same function. Therefore, W7 was chosen as the preferred measure for delivery of water to the Northern Unit. Lifecycle costs are included in the estimate. |

### 2.4.4 Selection and Combination of Measures into Alternatives

Alternatives were developed that combined the best measures to provide a broad range of alternatives. Based on discussions with the sponsor and a study team review of goals and objectives, these alternatives are supported and suitable for evaluation and comparison analysis.

### 2.4.5 Description of Alternatives Plans

The goals for the Northern Unit are to improve aquatic habitat, enhance wetlands, and terrestrial habitats through improved water level management, spawning and nursery habitats, water quality, migratory waterfowl and shorebird areas, enhanced heron feeding areas, diversity and extent of aquatic vegetation and protection of the heron and egret rookery. Alternative plans for Rehabilitation of Slim and Round Lakes, and Sculpting for Drainage were not evaluated as separate plans. The study team estimated that either measure was not consistent with project objectives as stand-alone measures. In addition, for water level management to be successful, specific measure P2 - Raise Low Elevation Swale on Natural Levee, must be constructed and is therefore included in all alternative plans except N0, the "no action alternative." Eight possible combinations exist among the alternatives available

for implementation in the Northern Unit. These measures were combined into alternative plans that represent the full range of alternatives.

The alternative plans are:

***N0 No Action Alternative.*** Over the 50-year life of the project, if nothing is done, we will see significant losses (approximately 30%) of the moist soil and emergent cover types necessary for healthy moist soil plant production. Further, the shallow water feeding areas that support the heron rookery will decline by approximately 40%. Finally, the scrub-shrub and forested areas will grow in proportion to the losses seen for moist soil/emergent and shallow water. The Northern Unit is already predominantly forested and the willow dominated scrub-shrub cover types have marginal habitat value in relation to what is being lost in moist soil plant production.

***N1 Water Level Management and Natural Hydraulics.*** This alternative involves placing material, constructing a gate and spillway structure on the CILCO Causeway, grading, and seeding of the levee structure. The low spots along the natural levee would be filled to facilitate water level management. The natural river hydraulics would be used to fill the upper lakes.

***N2 Water Level Management, Natural Hydraulics, and Rehabilitate Slim and Round Lakes.*** This alternative involves placing material, constructing a gate and spillway structure on the CILCO Causeway, grading, and seeding of the levee structure. The low spots along the natural levee would be filled to facilitate water level management. The natural river hydraulics would be used to fill the upper lakes. This alternative also involves removing willows and sediment from Slim, Round, and Little Round Lakes. Material may be used to construct the water level management structure on the CILCO Causeway.

***N3 Water Level Management, Natural Hydraulics and Sculpting for Drainage.*** This alternative involves placing material, constructing a gate and spillway structure on the CILCO Causeway, grading, and seeding of the levee structure. The low spots along the natural levee would be filled to facilitate water level management. The natural river hydraulics would be used to fill the upper lakes. This alternative also would involve sculpting of Northern Unit submerged contours to allow for complete drainage of upper unit to eliminate ponding during low water and/or drawdowns. Material may be used to construct the water level management structure on the CILCO Causeway.

***N4 Water Level Management, Natural Hydraulics, Rehabilitate Slim and Round Lakes, and Sculpting for Drainage.*** This alternative involves placing material, constructing a gate and spillway structure on the CILCO Causeway, grading, and seeding of the levee structure. The low spots along the natural levee would be filled to facilitate water level management. The natural river hydraulics would be used to fill the upper lakes. This alternative also would involve removing willows and sediment from Slim, Round, and Little Round Lakes. This alternative also would involve sculpting of Northern Unit submerged contours to allow for complete drainage of upper Unit to

eliminate ponding during low water and/or drawdowns. Material may be used to construct the water level management structure on the CILCO Causeway.

***N5 Water Level Management and Pump & Well.*** This alternative involves placing material, constructing a gate and spillway structure on the CILCO Causeway, grading, and seeding of the levee structure. The low spots along the natural levee would be filled to facilitate water level management. A pump and well would be installed to deliver water supply to the upper lakes.

***N6 Water Level Management, Pump & Well, and Rehabilitate Slim and Round Lakes.*** This alternative involves placing material, constructing a gate and spillway structure on the CILCO Causeway, grading, and seeding of the levee structure. The low spots along the natural levee would be filled to facilitate water level management. A pump and well would be installed to deliver water supply to the upper lakes. This alternative also would involve removing willows and sediment from Slim, Round, and Little Round Lakes. Material may be used to construct the water level management structure on the CILCO Causeway.

***N7 Water Level Management, Pump & Well, and Sculpting for Drainage.*** This alternative involves placing material, constructing a gate and spillway structure on the CILCO Causeway, grading, and seeding of the levee structure. The low spots along the natural levee would be filled to facilitate water level management. A pump and well would be installed to deliver water supply to the upper lakes. This alternative also would involve sculpting of Northern Unit submerged contours to allow for complete drainage of the upper nit to eliminate ponding during low water and/or drawdowns. Material may be used to construct the water level management structure on the CILCO Causeway.

***N8 Water Level Management, Pump & Well, Sculpting for Drainage, and Rehabilitate Slim and Round Lakes.*** This alternative involves placing material, constructing a gate and spillway structure on the CILCO Causeway, grading, and seeding of the levee structure. The low spots along the natural levee would be filled to facilitate water level management. A pump and well would be installed to deliver water supply to the upper lakes. This alternative also would involve removing willows and sediment from Slim, Round, and Little Round Lakes. This alternative also would involve sculpting of Northern Unit submerged contours to allow for complete drainage of the upper unit to eliminate ponding during low water and/or drawdowns. Material may be used to construct the water level management structure on the CILCO Causeway.

## 2.5 EVALUATE AND COMPARE ALTERNATIVE PLANS

This section describes the alternative plans and the process used to determine the potential costs, habitat benefits, incremental cost/cost effectiveness, and other factors leading to a recommended plan.

### 2.5.1 Incremental Cost/Cost Effectiveness Analysis Process

Cost effectiveness analysis was used to determine what project features should be built, based on habitat benefits (outputs) that meet the goals and objectives of the project and at the same time are the most cost effective. The Corps of Engineers has incorporated cost effectiveness analysis into its planning process for all ecosystem restoration planning efforts. A cost effectiveness analysis is conducted to ensure that least cost alternatives are identified for various levels of output. After the cost effectiveness of the alternatives has been established, incremental cost analysis is conducted to reveal and evaluate changes in cost for increasing levels of environmental output.

Cost effectiveness and incremental analysis is a three-step procedure: (1) calculate the environmental outputs of each alternative; (2) determine a cost estimate for each alternative; and (3) combine the alternatives to evaluate the best overall project alternative based on habitat benefits and cost. While cost and environmental outputs are necessary factors, other factors such as the ability to construct, schedule, likelihood to achieve projected results, un-measurable environmental benefits, ancillary benefits, etc., are very important in deciding on the preferred alternative.

Environmental outputs were calculated as average annual habitat units (AAHUs). The annualized costs were calculated by applying a 6-3/8% annual interest rate to the construction costs over the 50-year life of the project. The incremental analysis for each alternative was accomplished using the Corps of Engineers Institute for Water Resources methodology described in Robinson *et al.* Further information on the analysis can be found in Appendix A-4 of this report.

### 2.5.2 Habitat Evaluation Procedures

A habitat analysis was conducted to evaluate potential benefits of habitat improvement features for the Northern Unit of the Pekin Lake SFWA. Biologists from the Rock Island District of the U.S. Army Corps of Engineers (Corps) used a modified form of the Habitat Evaluation Procedure (HEP) program called EXHEP (EXpert Habitat Evaluation Procedures). For a more detailed explanation of the HEP evaluation process and its general application, refer to Appendix A-4 of this document.

The U.S. Army (Engineer Research and Development Center), Environmental Laboratory, developed the EXHEP software. It is a field evaluation procedure designed to estimate habitat quality and account for changes due to land management practices. The EXHEP program takes a rather specific approach and evaluates target species that are selected to be representative of habitat quality. This software integrates the formal scientific literature

supporting the application of each HSI (Habitat Suitability Index) model, with the final reports generated by the EXHEP software. EXHEP also evaluated a broad range of target years for each species within a specified habitat type. By doing this, it is able to show habitat benefit gains and losses throughout the life of a project.

EXHEP is a species-driven evaluation process that involves mathematical associations between environmental cover types and the individual variables that compose each of those cover types. During the evaluation process, each variable of a cover type was calculated on a 0.1 to 1.0 index. This evaluation was done using suitability graphs created by the U.S. Fish and Wildlife Service (USFWS) for the HSI Models Series. This series was researched and created by the USFWS to provide habitat information useful for impact assessment and habitat management. The variable suitability outcomes were then inserted into a Habitat Suitability Equation (also taken from the USFWS Habitat Suitability Series). The Habitat Suitability Equation is an evaluation that combines all Life Requisites of the specified wildlife and designates it a suitability index number. This final suitability number was then used to calculate final with- and without-project AAHUs.

Several habitat types represented by species-driven HSI models were evaluated in this document. Although a particular species is used, each species represents required habitat for many other similar species that utilize the same habitat in similar ways. In essence, each species represents an array of habitat variables for the species being evaluated. These species represent key goals and objectives for the development of specific habitat types proposed by the project.

The use of this information is required to derive quantitative relationships between key environmental variables and habitat suitability within the Northern Unit of the Pekin Lake SFWA. This provides the foundation for the HEP application of the species-based HSI models.

### 2.5.3 Habitat Evaluation

The primary management objective in the Northern Unit is to achieve higher rates of quality moist soil plant production. A model was created to assess the habitat benefits of this project as it pertains to the moist soil/emergent category. The premise of this model is based off the Marsh Wren blue book published by the USFWS. The marsh wren (*Cistothorus palustri*) is an abundant breeding bird species of freshwater and saltwater marshes and requires emergent vegetation with shallow standing water. However, there seemed to be a deficiency in trying to assess and quantify the benefits of the increased flood protection of the upper cell. This model was developed to link hydrograph data to a mathematical equation of the Marsh Wren model to produce a HEP suitability of emergent/moist soil cover types.

The success of water level management in the Northern Unit is guided by the following hydrologic assumptions: The water level recurrence for two new intervals: Jul 1 - Oct 15 and Sep 15 - Oct 31 is presented in Figure 2-4, below. This provides the chances that water will overtop the given elevation in a given year. For example, taking 438 feet as our elevation, the graph indicates that water will exceed 438 feet at least once between July 1 and October 15 in

about 75% of years, and at least once between September 15 and October 31 in about 30% of years. It is likely that the combination of a completely dry summer with a late season rise (assuming the 438 elevation) would occur less often than the 7.5% of the time predicted assuming that these factors are independent of each other.

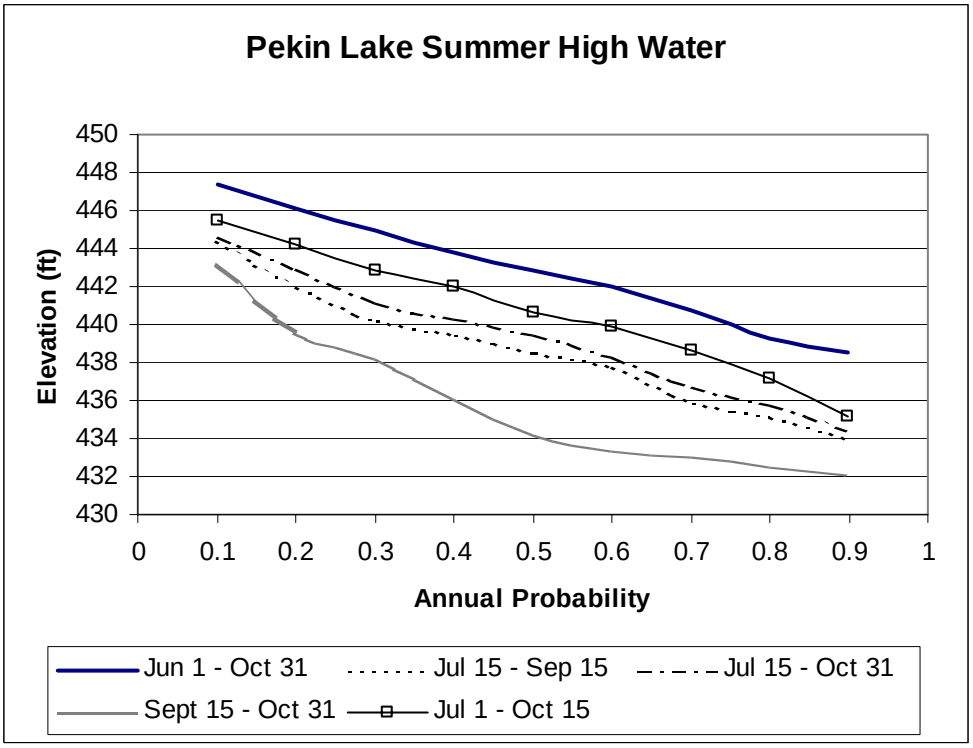


**Figure 2-4. Pekin Lake high water level occurrence.**

Two other species, along with the modified marsh wren model described above, were chosen to evaluate the Northern Unit Habitat. The great blue heron (*Ardea herodias*) is the largest and most widely distributed of the herons and occurs in a variety of habitats from freshwater lakes and rivers to brackish marshes and coastal wetlands. Fish are their preferred diet, but they will eat a large variety of other small aquatic and terrestrial creatures (e.g., frogs, newts, snakes, rodents, insects, snails, etc.). The wood duck (*Aix sponsa*) is a waterfowl found around wetland areas with open water and nests in tree cavities or nest boxes.

To assess change over the period of analysis, target years have been defined. At each target year, change in habitat variables may be noticed. Noticeable changes can be characterized by a change in habitat benefit output. Embedded in each cover type evaluation, change has been added to the model. For project planning and impact analysis, project life was established at 50 years. To facilitate comparison, target years were established at 0 (existing conditions), 1 year after, 5 years after, 20 years after, and 50 years after project construction.

The quantitative component of the EXHEP analysis is the measure of the acres of habitat that are available for the selected species. From the qualitative and quantitative determinations, the standard unit of measure, the Habitat Unit (HU), was calculated using the formula (HSI x Acres = HUs). Changes in the quality and/or quantity of HUs occur as a habitat matures naturally or is influenced by development. These changes influence the cumulative HUs derived over the life of the project. HSIs and AAHUs for each evaluation species were calculated to reflect expected habitat conditions over the life of the project. Then, cumulative HUs were annualized and averaged. This determined what is known as Average Annual Habitat Units (AAHUs). AAHUs were used as an output measurement to compare all the features and project as a whole.

The options considered were variations of water level management that included a constant water supply or natural river hydraulics. Additional increments included rehabilitation of Slim Lake through willow removal and sculpting of Worley Lake to prevent standing water during water level drawdowns. The proposed selected alternative would not create new habitat types so to speak, but would maintain existing moist soil plant communities from becoming scrub shrub and return scrub shrub areas to moist soil plant production. Further, the frequency at which moist soil plants are actually produced would be significantly expanded through active water level management of the Unit.

The project would provide moist soil/emergent features that include open water, seasonally wet areas, and emergent vegetation. Table 2-5 shows the relative changes in HU outputs for each alternative plan for each of the species utilized in the HEP analysis. For a more detailed description of the habitat analysis, refer to Appendix A-4 of this report.

**Table 2-5. Habitat units by plan for the Northern Unit.**

| **Habitat Response to Alternative Plans** | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| ***Northern Unit*** | | ***Plans*** | | | | | | | |
| ***Species*** | | *N0* | *N1* | *N2* | *N3* | *N4* | *N5* | *N6* | *N7* | *N8* |
| | *Emergent Suitability* | 0 | 40.6 | 65.4 | 38.3 | 63.1 | 68.8 | 101.3 | 65.8 | 98.3 |
| | *Great Blue Heron* | 0 | 5.9 | 5.9 | 12 | 12 | 5.9 | 5.9 | 12 | 12 |
| | *Wood Duck* | 0 | 0 | -0.8 | 0 | -0.8 | 0 | -0.8 | 0 | -0.8 |
| | *Total HUs* | 0 | 46.5 | 70.5 | 50.3 | 74.3 | 74.7 | 106.4 | 77.8 | 109.5 |

### 2.5.4 Cost Estimates for Habitat Improvement Measures

Rough cost estimates were developed to conduct the cost effectiveness and incremental cost analysis of the various alternative plans. Items included in the first cost construction estimated are mobilization, dredging, placement, demobilization, 25% contingency, EDC,

S&A, and As-Built drawing costs. Table 2-6 summarizes the costs associated with each alternative plan.

**Table 2-6. Northern Unit alternative plans costs.**

| Alternative Plans | Name | First Cost Construction | Annualized Cost |
|---|---|---|---|
| *N0* | No Action<br>L0+M0 | $0 | $0 |
| *N1* | Water Level Management and Natural Hydraulics<br>L1+P2 | $3,376,721 | $217,981 |
| *N2* | Water Level Management, Natural Hydraulics, and Rehabilitate Slim and Round Lakes<br>L1+P2+M1B2 | $4,481,056 | $289,270 |
| *N3* | Water Level Management, Natural Hydraulics, and Sculpting for Drainage<br>L1+P2+M2 | $3,489,144 | 225,238 |
| *N4* | Water Level Management, Natural Hydraulics, Rehabilitate Slim and Round Lakes, and Sculpting for Drainage<br>L1+P2+M1B2 | $4,754,064 | $306,894 |
| *N5* | Water Level Management and Pump & Well<br>L1+P2++W7D | $5,072,756 | $327,467 |
| *N6* | Water Level Management, Pump & Well, and Rehabilitate Slim and Round Lakes<br>L1+P2+M1B2+W7D | $5,671,903 | $366,144 |
| *N7* | Water Level Management, Pump & Well, and Sculpting for Drainage<br>L1+P2+M2+W7D | $5,111,232 | $329,950 |
| *N8* | Water Level Management, Pump & Well, Rehabilitate Slim and Round Lakes, and Sculpting for Drainage<br>L1+P2+M1B2+M2+W7D | $6,038,979 | $389,840 |

### 2.5.5 Results of the Incremental Cost/Cost Effectiveness Analysis – Northern Unit

The results of the cost effectiveness analysis for the Northern Unit alternative plans showed that N0 N6and N8 were all cost-effective plans. The No Action Alternative is always cost effective. Cost effectiveness means that no plan can provide the same benefits for less cost or more benefits for the same cost. Alternative N6 exhibited the lowest cost per unit of all alternatives, $3,441 AAHU. Alternative N8 exhibited the highest cost per unit of all alternatives, $3,560 AAHU.

**Table 2-7. Northern Unit alternative plans evaluation.**

| Alt. Plans | Name | AAHU Output | First Cost Const. | Annualized Cost | Annualized Cost/AAHU |
|---|---|---|---|---|---|
| *N0* | No Action<br>L0+M0 | 0 | $0 | $0 | $0 |
| *N1* | Water Level Management and Natural Hydraulics<br>L1+P2 | 46.5 | $3,376,721 | $217,981 | $4,687 |
| *N2* | Water Level Management, Natural Hydraulics, and Rehabilitate Slim Lake<br>L1+P2+M1B2 | 70.5 | $4,481,056 | $289,270 | $4,103 |
| *N3* | Water Level Management, Natural Hydraulics, and Sculpting for Drainage<br>L1+P2+M2 | 50.3 | $3,489,144 | 225,238 | $4,477 |
| *N4* | Water Level Management, Natural Hydraulics, Rehabilitate Slim Lake, and Sculpting for Drainage<br>L1+P2+M1B2+M2 | 74.3 | $4,754,064 | $306,894 | $4,130 |
| *N5* | Water Level Management and Pump & Well<br>L1+P2+W7D | 74.7 | $5,072,756 | $327,467 | $4,383 |
| *N6* | Water Level Management, Pump & Well, and Rehabilitate Slim Lake<br>L1+P2+M1B2+W7D | 106.4 | $5,671,903 | $366,144 | $3,441 |
| *N7* | Water Level Management, Pump & Well, and Sculpting for Drainage<br>L1+P2+M2+W7D | 77.8 | $5,111,232 | $329,950 | $4,241 |
| *N8* | Water Level Management, Pump & Well, Rehabilitate Slim Lake, and Sculpting for Drainage<br>L1+P2+M1B2+M2+W7D | 109.5 | $6,038,979 | $389,840 | $3,560 |

Alternative Plans N0, N3, and N8 were also considered best buy plans. The plans provide the greatest increase in benefits for the least increase in costs. Alternative plan N6 provides 106.4 AAHUs at an annualized incremental cost of $3,441 AAHU (Table 2-8). Alternative plan N8 provides an additional 3.1 AAHUs at an annualized incremental cost of $7,643 per AAHU.

**Table 2-8. Incremental cost analysis of best buy alternative plans for Northern Unit.**

| Alt. Plans | Name | AAHU Output ** | Annualized Cost * | Annualized Cost/AAHU | Inc. Cost | Inc. Output | Inc. $/AAHU |
|---|---|---|---|---|---|---|---|
| *N0* | No Action<br>L0+M0 | 0 | $0 | $0 | $0 | 0 | $0 |
| *N6* | Water Level Management, Pump & Well, and Rehabilitate Slim Lake<br>L1+P2+M1B2+W7D | 106.4 | $366,144 | $3,441 | $366,144 | 106.4 | $3,441 |
| *N8* | Water Level Management, Pump & Well, Rehabilitate Slim Lake and Sculpting for Drainage<br>L1+P2+M1+M2 | 109.5 | $389,840 | $3,560 | $23,696 | 3.1 | $7,643 |

* Annualized cost is initial construction cost based on a 50-year project life, 6.125% interest rate.
** Outputs are calculated as Average Annual Habitat Units (AAHUs).

## 2.5.6 Other Factors

### 2.5.6.1 Significance

The Illinois River has long been an important environmental and economic resource. Congress recognized the Illinois River, part of the Upper Mississippi River System, as a unique, nationally significant ecosystem and a nationally significant commercial navigation system in Section 1103 of the Water Resources Development Act of 1986 (WRDA). The State of Illinois has recognized the importance of the Illinois River though enactment of the Illinois River Watershed Restoration Act; 20 ILCS 3967. This public act has been instrumental in development of the *Integrated Management Plan for the Illinois Rive*r. This document has guided the restoration efforts underway between the Corps and the IDNR. The National Research Council considers large floodplain-river ecosystems to be the highest priority for aquatic restoration. The Council has identified the Illinois River as one of three in the United States with sufficient ecological integrity to recover. The Illinois Valley also has international significance as a part of the Mississippi Flyway, a major migration route for hundreds of thousands of waterfowl, shorebirds, and neotropical birds.

The entire Upper Mississippi River System has undergone dramatic changes in the extent, composition, and structure of its floodplain forests over the last two centuries. The unstable hydrologic regime at Pekin Lake SFWA limits the productivity of existing moist soil and emergent habitats there. The *Habitat Needs Assessment* conducted as part of the Upper Mississippi River System - Environmental Management Program found that the most critical need along the Illinois River was the restoration of backwater lakes and side channels to increase depth diversity. Further, the report called for the restoration of hydrologic variability needed to restore and maintain existing backwater habitat. The recommended plan will provide for the greatest amount of depth diversity.

#### 2.5.6.2 Hydrological/Sustainability

The alternatives that have been evaluated will produce a more sustainable hydrologic regime that is conducive to the growth of moist soil plant vegetation. Further, no significant impacts to flood heights are expected (Appendix D).

#### 2.5.6.3 Public Acceptability

The City of Pekin has expressed strong interest and support for the recommendations made by this study. In addition, at a public open house, 50 citizens expressed strong support for the recommended plan. Finally, Ducks Unlimited supports the plan and has agreed to provide financial support to the project.

#### 2.5.6.4 Hazardous, Toxic, and Radioactive Waste (HTRW)

A Phase I Environmental Site Assessment (ESA) was conducted for the proposed project location in the Pekin Lake SFWA Northern Unit(see Appendix B). The review discovered no known potential HTRW issues at the proposed site.

#### 2.5.6.5 Real Estate

Most of the land for the proposed alternative is currently in public ownership (see Appendix H). The State of Illinois owns all of the property with the exception of the CILCO Causeway and access points from the railroad and private property. Both groups are interested in participating in restoration.

#### 2.5.6.6 Independent, Immediate and Substantial Restoration, Preservation and Protection benefits

The authorizing language (Section 519, Water Resources Development Act of 2000) requires that Illinois River Basin Restoration critical restoration projects produce immediate, independent, and substantial restoration, preservation and protection benefits; the recommended plan meets these criteria. Restoration benefits will be immediate, as habitats will be created and made more productive once the existing structures are modified. The project will be independent, requiring no other non-project feature to meet performance objectives. The benefits will be substantial as waterfowl, including threatened and endangered species will have access to higher quality habitats.

## 2.6 SELECTION OF A RECOMMENDED PLAN

The interagency team recommends Alternative Plan N8 - Water Level Management, Pump & Well, Sculpting for Drainage, and Rehabilitate Slim, and Round Lakes (Plate 2) as the National Ecosystem Restoration (NER) plan. This recommendation considers the cost effectiveness/incremental cost analysis and the significance of the habitat being gained.

This alternative best meets the study objectives. It will result in maintaining and increasing the productivity of moist soil plant producing areas in Worley, Round, and Slim Lakes while protecting the Heron rookery. The moist soil/emergent habitat types will increase, by the end of the project life, approximately 27 acres over the without project conditions. Further, the existing moist soil plant areas will not be converted to scrub shrub and forest. The existing shallow water areas will see a slight increase in acreage over without-project conditions (approximately 3). Forested areas will be relatively maintained with areas currently covered with willows being maintained at current levels. Further, the frequency with which moist soil plants will have favorable conditions to grow will increase by 35% in the late summer months, with a further increase of 40% in the fall months.

**Table 2-9. Northern Unit with-project conditions.**

| **Northern Unit Baseline Habitat Conditions** | | **With-Project Acres by Target Year** | | | | |
|---|---|---|---|---|---|---|
| **Cover Types** | **Description** | **0** | **1** | **5** | **20** | **50.0** |
| *Deep* | **Deep water = or > 4ft in depth** | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** |
| *Shallow* | **Shallow open water** | **29.2** | **37.8** | **35.5** | **28.0** | **15.8** |
| *Moist/Emergent* | **Combination of moist soil, mud flat, and emergent cover types** | **218.4** | **266.6** | **252.8** | **207.2** | **129.3** |
| *Scrub-Shrub* | **Scrub Shrub areas that are invading the Moist Emergent areas, predominantly willows.** | **130.1** | **71.4** | **83.1** | **118.8** | **157.2** |
| *Forested* | **Forested areas, including forested wetland and bottomland hardwood** | **304.2** | **306.2** | **310.4** | **327.9** | **379.6** |
| | | **681.9** | **681.9** | **681.9** | **681.9** | **681.9** |

In cooperation with the USFWS and the IDNR, the Corps has planned and will design a project that serves the needs of the resources and the resource managers, while being cost conscious. The preferred alternative plan has an overall output of 109.5 AAHUs for a total first cost of approximately $6,348,979.

Section 3

# Description of Selected Plan

## 3.1 DESIGN AND CONSTRUCTION CONSIDERATIONS

### 3.1.1 Description of Selected Alternatives: Alternative Plan (N8)

#### 3.1.1.1 Cross Levee

Using conventional earthmoving equipment, a new levee would be constructed along the existing rubble causeway alignment (see Plate 1A) between the railroad corridor and the existing natural river bankline. The levee would be capable of holding higher water levels in the Northern Unit during dry periods and would protect it from varying water levels that might otherwise kill moist soil plants and disturb wading bird habitat. The levee would be constructed by using adjacent borrow material for the levee core. A low spot in the natural bankline along the river would be filled to maintain the Northern Unit's protection level (see Plate 2).

#### 3.1.1.2 Northern Unit Drainage

Material would be removed to form a ditch that would allow the upper lakes to drain completely during periods of low water, avoiding ponding and potential botulism problems (see Plate 2A).

#### 3.1.1.3 Water Control Structure

A stop-log type water control structure (see Plate 1A) would be constructed in the new impervious clay levee with a bridge on top to allow access for maintenance equipment. The gravity water control structure would be able to function at several discrete water levels and in either direction. During periods when it is desirable to keep Illinois River fluctuations from damaging moist soil plants, the levee and control structure would serve to keep water out of the Northern Unit. During dry periods, the system would retain sufficient water levels to sustain wildlife. The levee and control structure would be submersible to avoid damage and minimize maintenance during and after high water events.

#### 3.1.1.4 Water Source

In order to provide a reliable water source to the Northern Unit during dry periods, wells would be constructed and pumps placed toward the southeast end of the site (see Plate 4A). This would require that material from on site be placed and compacted adjacent to the railroad corridor to provide high ground for a maintenance road and some degree of flood protection for the wellheads and electrical connections. Well water would flow directly into Worley Lake after running across an aerating open waterfall and would be capable of filling the upper lakes and sustaining water levels during typical dry periods. Given typical dry conditions following a sharp drop in Illinois River water surface levels, it is estimated that the water level in the Northern Unit would need to be raised by 1 foot in less than 10 days in order to sustain moist soil plants and wildlife. It is estimated that a pump flow rate of approximately 5,000 gallons per minute (gpm) would be required to fill the site in approximately 9 days. It is also estimated that a single-core well could produce approximately 1,000 gpm. Since cost estimates for a well large enough to provide 5,000 gpm far exceeded the cost of drilling five separate 1,000-gpm wells, the design team chose to construct an embankment and five 1,000-gpm wells.

#### 3.1.1.5 Lakebed Rehabilitation

Willow encroachment in Round Lake, Little Round Lake, and the northern end of Slim Lake would also be removed, and sediment would be removed to restore these lakes to moist soil plant and wading bird habitat (see Plate 3A).

### 3.1.2 Design Strategy and Assumptions

Construction in the Northern Unit would be done during a dry period when conventional earthmoving equipment could be used. A possible ancillary benefit to the project may be to provide access periodically from Route 29 to the Illinois River bankline to remove sandy material dredged from the main channel for beneficial use.

Since the new causeway would serve as not only a levee to contain water at a head differential of 8 feet or less, but also as an access road for the operation and maintenance of the site, material would be placed by conventional earthmoving and construction methods to avoid consolidation issues and to ensure proper compaction of the material.

### 3.1.3 Final Design Considerations and Field Data

The contractor shall field verify all elevations, dimensions, and quantities before commencement of work.

### 3.1.4 Contractor Submittals

- Equipment used
- Method of dredging

- Compaction testing method
- Rate of dredging
- Well and pump data

### 3.1.5 Hydrology and Hydraulics

The hydrologic conditions in the Pekin Lake project area are largely determined by the Illinois River water level. The current dams at La Grange and Peoria maintain lower water levels in this area than had been experienced prior to 1936 because the pool of La Grange dam is maintained 6 feet lower (429 feet NGVD) than the pool of the Copperas Creek dam, which had previously influenced the site water level. Existing long-term daily water level records indicate that the site is generally flooded from late March through late May, but that there is at least a 10% chance that it will be flooded on any day of the year except from late July until November. In addition, the site can be expected to flood at least once even during the 10-year low-flow year, but it draws down nearly every year so that the surface water outlet to the river goes dry.

Because the proposed restoration project would place dredged material in the floodplain, a hydraulic impact assessment was completed to determine whether the material placement would significantly raise the water surface elevations. Considering a maximum potential impact scenario where all potential restoration activities are conducted on the Pekin Lake site, the proposed project would not cause an unpermitted increase in water surface elevations. In addition, at no point would the average channel velocity increase above 2.2 ft/s, indicating that bed erosion would not be instigated by the material placement.

Slim and Worley Lakes, which form a single water body at all but the driest portions of the year, are separated from the rest of the Pekin Lake SFWA by the CILCO Causeway, an uneven embankment that currently does not permanently impound water. A staff gage was installed on Worley Lake to evaluate the behavior of the lake after the river level falls and it becomes disconnected from the lake. Water level data observed at this gage from July 19 to September 4, 2002, indicate that the Northern Unit is capable of retaining water even when the difference between lake and river levels exceeds 4 feet. The desired water level regime for the restored Northern Unit maintains an uninterrupted drawdown during the summer to allow moist soil plant production followed by a gradual water level rise to a level that would be held stable until spring. Without altering the natural riverside levee, it would be expected that the Northern Unit would have approximately a 60% chance of flooding at least once between July 1 and October 15 in any given year, even if measures were taken to prevent water from backing onto the site from the outlet. If water exceeding 438 feet NGVD were able to flow into the lake it would be possible to use river water to supply a fall rise (between September 15 and October 31) during approximately 30% of all years. If high flows in the Illinois River were to coincide with a drawdown period and water were to flow over the river levee and into the Northern Unit, maximum flow velocities would be approximately 5.0 to 5.4 ft/s at the natural bankline overflow point but would be less than 2.0 ft/s over the rest of the flow route; erosion and downcutting is not expected in this area even under worst case conditions.

### 3.1.6 Geotechnical

The Northern Unit is generally composed of uniform stiff clays throughout the depth of all proposed construction. It is estimated that construction could be accomplished during dry periods with conventional earthmoving equipment, and that the material would be appropriate for use in constructing impervious clay levees. Stone protection would have to be transported to the project site. It is estimated that no stone protection would be necessary on the slopes of the new levee, due to very low estimated flow velocities, relatively short wind-fetch distances, and relatively flat side slopes. A detailed geotechnical analysis of the Pekin Lake SFWA - Northern Unit area and project considerations can be found in Appendix C.

### 3.1.7 Foundations

The foundations required on site would be for the water control structure along the new causeway alignment and the areas where the groundwater wells will be housed. The material in this area, once rubble is moved, is generally hard clay. The water control structure would likely be constructed on a pile foundation with a sheet-pile cutoff. Wells would be drilled through the constructed embankment along the east side of Worley Lake, through the thick clay layer, and into the aquifer below. Bollards would be installed to protect wellheads.

### 3.1.8 Borrow Sites/Suitability/Water Table

The material in the vicinity of the upper lakes is generally hard clay and is well suited to the construction of a clay causeway (levee). The water table in the area varies as Illinois River levels vary.

## 3.2 NATURAL RESOURCES RESTRICTIONS/CONSIDERATIONS

Survival of the bottomland forest within the project area should be maintained to the extent possible. Therefore, minimal impacts to the forestry component should be observed whenever possible. However, this does not apply to the invading willows to be removed from Slim, Round, and Little Round Lakes. Also, any removal of peeling or loose-barked trees of 9 inches or greater in diameter at breast height would **only** take place between September 30 and April 1.

Activities within the upper unit must be done in a manner that does not adversely impact the existing historic heron rookery. No trees adjacent to the rookery would be removed during construction of the project. No construction activities would occur between February and August in the Northern Unit lakes. However, the cross levee, wells and pumps, and water control structure could be constructed during any low-water period.

Stands of decurrent false aster are known to occur in the Northern Unit. Before any construction is started, qualified individuals will survey construction areas to ensure that there are no false aster plants within the impact zone. If any plants are found, the area will

be noted and the plants will be relocated to a nearby colony. After project completion, false aster plants will be relocated within the same general area or as near as possible to the site where found originally. Decurrent false aster thrives in disturbed ground, and construction activities may benefit the species. While some impacts to wetlands are unavoidable, those impacts would be kept to the minimum required to produce overall improvement to the Pekin Lake SFWA.

Equipment brought into the area from other project sites should be clean and free of debris, to prevent the introduction of invasive, non-native species from other areas.

## 3.3 CONSTRUCTION

### 3.3.1 Site Access/Staging

The Northern Unit can be accessed from the City of Pekin via a public railroad crossing and gravel road to the west of the railroad.

### 3.3.2 Site Elevations

Existing upper lakes bottom elevations are in the 434.5 ft to 436 ft range. The existing causeway under the power lines presently has a top elevation of between approximately 438 ft and 439 ft, with the exception of a low section approximately 800 feet from the railroad tracks, which is approximately 80 feet long and dips to an elevation of approximately 436 ft. The elevations where willow encroachment is occurring in Slim Lake are between 437 ft and 438 ft.

The natural bankline between the Pekin Lake SFWA site and the Illinois River varies, but is generally above elevation 444 ft (see Plate 5A) for a profile of a line of protection surrounding the Northern Unit). The new causeway would be constructed to approximately elevation 444 ft, using the natural bankline as a continuance of the line of protection. High ground at the site is generally delineated by the railroad tracks above elevation 458.5 ft.

### 3.3.3 Construction Equipment Considerations

During dry periods, conventional earthmoving equipment may be used for all Northern Unit construction. In order to dewater the Northern Unit lakes, the existing CILCO Causeway may have to be breached to allow the site to drain.

### 3.3.4 Debris Removal/Disposal

Construction rubble that is currently at the causeway site shall remain in place and be completely covered during construction of the new causeway. Willows, woody vegetation and stumps from the rehabilitation of Slim Lake, Round Pond, and Little Round Lake (see Plate 3A) and any clearing necessary for the drilling of the well, installing the pump, and constructing the water supply ditch may be disposed of by chipping, burning, bulldozing to

the side, or removing off-site. If desired, some of the material could be used on site as fish structure within the lakes.

### 3.3.5 Monitoring During Construction – Water Quality

There have been no concerns regarding water quality in the Pekin Lake SFWA. Dissolved oxygen is estimated to be sufficient for sustaining aquatic habitat; however, the depth of water during dry periods is so shallow that the water reaches temperatures too high to sustain aquatic wildlife, resulting in large fish kills. A more detailed analysis can be found in Appendix E.

### 3.3.6 Construction Sequence

**Stage I (Initial Construction – one construction season)**

1. Demolish (bulldoze) a section of the existing causeway to drain the site.

2. Clear willows in Slim Lake, Round Lake, and Upper Lake of the Woods (see Plate 3A).

3. Use borrow material from the Round Pond rehabilitation to fill in a low spot in the natural bankline (see Plate 2).

4. Construct a stop-log water control structure with bridge along the new causeway alignment (see Plate 1A)

5. Excavate inspection trenches as necessary to establish an impervious compacted clay line of protection for the new causeway (see Plate 1A). Use excavated material from the Slim Lake, Round Pond, and Upper Lake of the Woods rehabilitation and adjacent borrow from the upper lakes and/or from drainage channel construction (see Plate 2A).

6. Construct embankment, drill wells, install pumps, and connect electricity (see Plate 4A).

**Stage II (Vegetation)**

Plant grass cover on the new causeway and filled-in natural bankline (see Plates 1A). Seed the constructed embankment and disturbed areas in the vicinity of the well location.

### 3.3.7 Permits

#### 3.3.7.1 Section 401/404

A public notice is required by Section 404 of the Clean Water Act, and Illinois State Section 401 water quality certification will be obtained prior to project construction as part of the Environmental Assessment.

#### 3.3.7.2 Section 402

Land disturbances, on greater than 5 acres, associated with this project require a National Pollutant Discharge Elimination System (NPDES) permit, or Section 402, for stormwater discharges. The construction contractor would be responsible for this permit.

#### 3.3.7.3 Floodplain

A HEC-RAS model was run using the most intrusive alternative for on-site dredged material placement, and it showed a negligible change in 100-year flood height, conveyance, and storage (see Appendix D - Hydrology and Hydraulics). A floodplain permit would be applied for prior to construction.

## 3.4 OPERATIONS, MAINTENANCE, AND REHABILITATION CONSIDERATIONS

### 3.4.1 Project Data Summary

The project lifespan is estimated to be at least 50 years. Regular operation would include installing and removing stop-logs in the water control structure as Illinois River water surface levels dictate, and operation of the wells. Maintenance would include pump servicing and upkeep of the water control structure, as well as regular inspections of the levee (line of protection) and pumps. Operation and maintenance costs, to be assumed at 100% sponsor cost upon completion of construction, can be found in Table 3-1.

### 3.4.2 Operation

The wells and pumps would need to be operated as often as necessary during low-water periods to increase or maintain the water surface elevation of the Northern Unit. Access to the wells and pumps would be through the CILCO Causeway easement. Stop-logs in the control structure would have to be removed or added depending upon the IDNR's desired water level in the Northern Unit. Access to the control structure and causeway would be from Route 29 across two sets of railroad tracks (at grade).

**TABLE 3-1. Pekin Lake SFWA Northern Unit – project summary.**

| Feature | Measurement | UOM |
|---|---|---|
| Causeway | | |
| Crown Elevation | 444 | feet |
| Crown Width | 10 | feet |
| Length | 4,000 | feet |
| Line of Protection | | |
| Minimum Elevation | 444 | feet |
| Length | 11,850 | feet |
| Control Structure | | |
| Sustained Water Retention Elevation | 437.0 | feet |
| Invert of Control Structure | 432.0 | feet |
| Invert of Inflow Weir | 441.0 | feet |
| Riprap | 500 | tons |
| Length | 100 | feet |
| Width (Bridge / Roadway) | 10 | feet |
| Slopes | 3H:1V | |
| Well | | |
| Quantity | 5 | each |
| Depth | 30 | feet |
| Head | 15 | feet |
| Pumping Rate | 3500-5000 | gpm |
| Drainage Swale Excavation | 1,001,000 | square feet |
| | 23.0 | acres |
| Rehabilitation in Slim Lake | 1,192,000 | square feet |
| | 27.4 | acres |
| Rehabilitation in Upper Lake of the Woods | 496,000 | square feet |
| | 11.4 | acres |
| Rehabilitation in Round Lake | 968,000 | square feet |
| | 22.2 | acres |
| Volume Removed (average 18" deep) | 203,000 | cubic yards |
| Volume Required to Build Heinold Causeway | 20,000 | cubic yards |
| Volume of Remaining Material | 183,000 | cubic yards |
| Footprint of Remaining Placed Material 8' High | 617,625 | square feet |
| | 14.2 | acres |

### 3.4.3 Maintenance

The wells and pumps would require periodic maintenance (minor painting, oiling, greasing, and inspections) to ensure proper operation, and may require pump replacement at some point during the design life of the entire project.

The causeway and line of protection shown on Plate 1A would require periodic inspections and mowing at least twice each year to remove and/or prevent woody growth on the structure. Repairing damage due to rodent holes or high-water events may be required as necessary. The water control structure in the causeway would require periodic inspections, periodic repair or replacement of stop-logs, and removal of debris (typically) after high-water events.

## 3.5 COST ESTIMATES AND FUNDING SCHEDULES (BY FEATURE CODE)

**TABLE 3-2. Pekin Lake Northern Unit cost summary, May 2003 price levels.**

| Account | Feature | Current Working Estimate (CWE) | Fully Funded Estimate |
|---|---|---|---|
| 01 | Lands and Damages | $ 1,735,000.00 | $ 1,735,000.00 |
| 02 | Relocations | $ - | $ - |
| 06 | Fish and Wildlife Facilities | $ 3,437,683.00 | $ 3,437,683.00 |
| 30 | Planning, Engineering, and Design | $ 556,904.00 | $ 446,898.79 |
| 31 | Construction Management | $ 309,391.00 | $ 343,768.30 |
| | Post-Construction Monitoring (50 yr) | $ - | $ - |
| | Total Project Cost | $ 6,038,978.00 | $ 5,963,350.09 |
| | Federal Cost | $ 3,925,335.70 | $ 3,876,177.56 |
| | State Cost | $ 2,113,642.30 | $ 2,087,172.53 |

**TABLE 3-3. Pekin Lake Northern Unit cost estimate, June 2002 price levels.**

| Acct Code | Item | Quantity | Unit | Unit Price | Amount | Contingency | Cont % |
|---|---|---|---|---|---|---|---|
| | **ALTERNATIVE N8** | | | | | | |
| 1 | **LANDS AND DAMAGES** | | | | | | |
| | **Non-Federal** | 1 | LS | $1,717,000.00 | $1,717,000.00 | $0.00 | 0.00 |
| | **Federal** | 1 | LS | $18,000.00 | $18,000.00 | $0.00 | 0.00 |
| | **LANDS AND DAMAGES TOTAL** | | | | **$1,735,000.00** | | |
| 6 | **FISH AND WILDLIFE FACILITIES** | | | | | | |
| 6.3 | **WILDLIFE FACILITIES AND SANCTUARIES** | | | | | | |
| | **Repair Low Spot in Levee (P2)** | | | | | | |
| | Clear Low Spot Near Bankline | 0.9 | AC | $2,250.00 | $2,025.00 | $506.00 | 0.25 |
| | Fill Low Spot Near Bankline | 5620 | CY | $6.00 | $33,720.00 | $8,435.00 | 0.25 |
| | Subtotal | | | | $35,745.00 | $8,941.00 | |
| | **Construction of Causeway (L1)** | | | | | | |
| | Inspection Trench | 8107 | CY | $10.15 | $82,286.05 | $20,575.00 | 0.25 |
| | Construct Levee Section | 35112 | CY | $7.25 | $254,562.00 | $63,320.00 | 0.25 |
| | Shaping | 24000 | SY | $1.70 | $40,800.00 | $9,959.00 | 0.25 |
| | Crushed Rock Access Road | 519 | CY | $34.75 | $18,035.25 | $4,505.00 | 0.25 |
| | Fencing Around Towers | 3000 | LF | $32.55 | $97,650.00 | $24,405.00 | 0.25 |
| | Seeding | 5 | AC | $1,040.00 | $5,200.00 | $1,290.00 | 0.25 |
| | Subtotal | | | | $498,533.30 | $124,054.00 | |
| | **Construction of Drainage Swale- In Upper Lakes** (construction as a result of excavation for well embankment, causeway, and repair of low spot) | | | | | | |
| | **Sediment Removal from Upper Lakes** | | | | | | |
| | Clear/Chip Wood Debris | 10 | AC | $3,470.00 | $34,700.00 | $8,675.00 | 0.25 |
| | Remove Material from Upper Lakes (see Note ) | 115601 | CY | $5.30 | $612,685.30 | $162,705.65 | 0.25 |
| | Subtotal | | | | $647,385.30 | $171,380.65 | |
| | **Construction of Water Control Structure** | | | | | | |
| | Water Control Structure | 1 | LS | $474,160.00 | $474,160.00 | $118,540.00 | 0.25 |
| | Subtotal | | | | $474,160.00 | $118,540.00 | |
| | **Mobilization/Demobilization** | | | | | | |
| | Mobilization | 1 | LS | $19,500.00 | $19,500.00 | $4,900.00 | 0.25 |
| | Demobilization | 1 | LS | $19,500.00 | $19,500.00 | $4,900.00 | 0.25 |
| | Subtotal | | | | $39,000.00 | $9,800.00 | |
| | **Construction of Well System** | | | | | | |
| | Well Embankment | 46667 | CY | $6.25 | $291,668.75 | $72,629.00 | 0.25 |
| | Construct Gravel Roadway | 370 | CY | $44.30 | $16,391.00 | $4,095.00 | 0.25 |
| | Construct Wells | 1 | LS | $740,285.00 | $740,285.00 | $185,075.00 | 0.25 |
| | Subtotal | | | | $1,048,344.75 | $261,799.00 | |
| | FISH & WILDLIFE FAC SUBTOTAL | | | | **$2,743,168.35** | | |
| | Contingencies Subtotal | | | | | **$694,514.65** | |
| | **FISH & WILDLIFE FAC TOTAL** | | | | **$3,437,683.00** | | |
| 30 | **Planning, Engineering and Design** | 1 | LS | $556,904.646 | **$556,904.65** | | |
| 31 | **Construction Management** | 1 | LS | $309,391.47 | **$309,391.47** | | |
| | **TOTAL PROJECT COST** | | | | **$6,038,979** | | |

Notes:

1. It was assumed that dozers will be used to push the material from the drainage swale to fill the low spot near the bankline.
2. It was assumed that scrapers will be used to excavate the material needed for the inspection trench and the causeway. Material will come from the drainage swale.
3. It was assumed that scrapers will be used to excavate the sediment that needs to be removed in order to assure positive drainage. The quantity is based on: 55,500 CY are required to be excavated from the drainage swale less the 5620 CY (needed to fill the low spot in the levee) less 8107 CY (needed to fill the inspection trench) less (35112-8107) CY (needed to fill the causeway) Therefore of the 55,500 CY to be excavated there is 14,768 CY that will be used for the well embankment.
4. The material that is excavated in order to construct the inspection trench will be placed in the causeway levee section.
5. It was assumed that scrapers will be used to excavate the Upper Lakes area and that the excavated material will be shaped to form a berm along the perimeter of the Upper Lakes. It is estimated that the total quantity of excavation required is 147,500 CY. After excavation for the well embankment, there is 115,601 CY that will need to be excavated. (147,500 CY less 31,899 CY) needed for the well embankment. and scrapers and pushed aside into a berm.
6. There is 46,667 CY needed for the well embankment. 14,768 CY will come from the drainage swale construction and 31899 CY will come from the Upper Lakes.

**TABLE 3-4. Northern Unit estimated annual operation costs, May 2003 price levels.**

| Item | Quantity | Unit | Unit Price | Total Cost |
|---|---|---|---|---|
| Operate Water Control Structure | 24 | HR | $ 30.00 | $ 720 |
| Operate Well & Pump | 200 | HR | $ 30.00 | $ 6,000 |
| Pump Electrical Power | 40691 | KWH | $ 0.085 | $ 3,459 |
| Pump Electricity Availability Charge | 12 | MO | $ 15.00 | $ 180 |
| | | | Subtotal | $ 10,358.73 |
| | | | Contingencies (25%) | $ 2,589.68 |
| | | | TOTAL | $ 12,948.41 |

**TABLE 3-5. Northern Unit estimated annual maintenance costs, May 2003 price levels.**

| Item | Quantity | Unit | Unit Price | Total Cost |
|---|---|---|---|---|
| Inspect Causeway/Levee | 48 | HR | $ 55.00 | $ 2,640 |
| Inspect Well & Pump | 30 | HR | $ 55.00 | $ 1,650 |
| Grease Valves at Well & Pump | 40 | HR | $ 30.00 | $ 1,200 |
| Electrical Repairs | 1 | LS | $ 175.00 | $ 175 |
| Debris Removal from Control Structure | 40 | HR | $ 68.00 | $ 2,720 |
| Mowing (6 acres twice each year) | 12 | AC | $ 61.00 | $ 732 |
| Sediment Removal | 1 | LS | $ 3,630.00 | $ 3,630 |
| Replace Pump at year 25 (annual payment) | 1 | LS | $ 555.00 | $ 555 |
| Rehabilitation[1] | | | | $ - |
| | | | Subtotal | $ 13,302.00 |
| | | | Contingencies (25%) | $ 3,325.50 |
| | | | TOTAL | $ 16,627.50 |

[1] Rehabilitation cannot be accurately estimated. Rehabilitation is reconstructive work that significantly exceeds the annual operation and maintenance requirements identified above, and which is needed as a result of major storms, flood events, or other catastrophes.

**TABLE 3-6. Northern Unit estimated annual post-construction annual monitoring costs, May 2003 price levels.**

| Item | Annual Cost |
|---|---|
| Engineering Data[1] | $ 2,000 |
| Natural Resources Data[1] | $ 2,000 |
| Subtotal | $ 4,000 |
| Contingency (20%) | $ 800 |
| Subtotal | $ 4,800 |
| Planning, Engineering, & Design[2] | $ 1,400 |
| TOTAL | $ 6,200 |

[1] Reference Appendix G.
[2] Includes cost of evaluation report.

*Project Funding Schedules*

Northern Unit work could potentially be done in one construction season, provided that a competent and capable contractor is awarded the job.

## 3.6 SCHEDULE FOR DESIGN AND CONSTRUCTION

### 3.6.1 Design/Planning Phase (subject to funding, report approval, and ROW acquisition)

| | |
|---|---|
| Feasibility Report | August 2003 |
| Final Design/Plans and Specifications/Pre-Final | March 2004 |

### 3.6.2 Construction Phase

| | |
|---|---|
| Project Cooperation Agreement Executed | April 2004 |
| Acquisition of LERRDs Complete | April 2004 |
| Contract Award | May 2004 |
| Construction Physically Complete | May 2005 |

Plans and Specifications would be developed between July 2003 and January 2004.

### 3.6.3 Quality Control and Quality Assurance

The Pekin Lake SFWA - Northern Unit product development team is responsible for producing a high quality product to meet the needs of the environment. Technical adequacy and quality shall be obtained through periodic internal reviews. Technical review of the project documents (computations, drawings, etc.) will be accomplished throughout the design and contract documentation period and before further technical review is done. Internal reviews will be documented through certification of a product development team checklist.

#### 3.6.3.1 Review Advisory Team (RAT)

This internal product review will take place at the 75% design completion stage. The Project Engineer will respond in writing to review comments submitted by members of the RAT. The purpose of the RAT is to accomplish an efficient, broad review of the project by senior engineers in all applicable disciplines. Junior engineers may also attend to gain experience and insight into the design and contract document preparation process. Members of the RAT will include, but may not be limited to:

Chief, Design Branch
Project Engineer
Geologist
Civil Engineer

Structural Engineer
Hydraulic Engineers
Electrical Engineer
Specifications Writer

### 3.6.3.2 Independent Technical Review (ITR)

The ITR team for the Pekin Lake SFWA - Northern Unit Ecosystem Restoration project will consist of personnel from the Rock Island District, U.S Army Corps of Engineers. Team members will be selected based on individual expertise and technical background in order to provide a comprehensive technical review. ITR team members will not have been directly involved with the development of the project. The review will be ongoing throughout product development using a team concept, not a cumulative review process performed only at the end of product completion. However, a scheduled review will be done at the 95% design completion stage, after completion of the RAT. To ensure a complete design that is suitable for bidding and constructing the activities depicted in the product, the ITR members should concentrate their focus on the technical, construction, and environmental product issues, ensuring that the product design package is based on sound engineering practices and construction techniques, applicable codes, and the latest environmental regulations.

### 3.6.3.3 BCOE (Biddability, Constructability, Operability and Environmental Review)

CEMVR Memorandum 1180-1-2 establishes a system and assigns responsibilities and implementation procedures to assure that BCOE reviews and considerations are integrated into construction procurement documents. After RAT and ITR comments are incorporated into the product, the Project Engineer will coordinate a BCOE review with Construction Division and Operations Division personnel at the project site. Reviewers will be advised in writing of actions taken on their specific comments. The reviewers will approve these responses, and changes will be incorporated into contract documents before advertisement.

Section 4

# Plan Implementation

This chapter represents the requirements for implementing the Recommended Plan, including Federal and non-Federal cost sharing, and the division of responsibilities between the Federal Government and the Non-Federal Sponsor, the Illinois Department of Natural Resources. It also lists the major milestones necessary for project approval and a schedule of milestones associated with designing and constructing the Recommended Plan.

## 4.1 DIVISION OF PLAN RESPONSIBILITY

### 4.1.1 Recommended Plan Cost Sharing

Federal and non-Federal cost sharing for the Recommended Plan is in accordance with Section 519 of the Water Resources Development Act of 1996, which establishes the cost-sharing rules for projects authorized after October 12, 1996. Ecosystem restoration projects require that the non-Federal share of the first cost of the project or the separable element be 35%. Non-Federal sponsors will provide 100% of any lands, easements, rights-of-way, relocations of utilities or other existing structures, and disposal areas (LERRDs). The value of LERRDs will be included in the non-Federal 35% share. Where the LERRDs exceed the non-Federal sponsor's 35% share, the sponsor will be reimbursed for the value of the LERRDs that exceed the 35% non-Federal share. The non-Federal sponsor is also responsible for 100% of the costs for operation, maintenance, repair, rehabilitation, and replacement (OMRR&R) of project features.

| **Pekin Lake** | | | | | |
|---|---|---|---|---|---|
| | | Non-Federal | | Federal | |
| Project Feature | First Cost | % | Cost | % | Cost |
| First Cost of Construction | $6,348,979 | 35% | $2,222,142 | 65% | $4,126,837 |
| LERRD Credit | | 100% | $1,702,000 | 0% | |
| Cash | | | $520,142 | | $4,126,837 |
| OMRR&R (average annual) | $29,575 | 100% | | 0% | |

### 4.1.2 Federal Responsibilities

The Federal Government would provide 65% of the first cost of implementing the Recommended Plan including Preconstruction Engineering and Design (PED), construction and construction management, which is estimated to total $4,126,837. In addition to its financial responsibility, the Federal Government would:

1. Design and prepare plans and specifications for construction of the Recommended Plan; and

2. Administer and manage contracts for construction and supervision of the project after authorization, funding, and execution of a Project Cooperation Agreement with the IDNR.

### 4.1.3 Non-Federal Responsibilities

The IDNR would be responsible for providing 35% of the First Cost of implementing the Recommended Plan. The 35% share of the project cost includes the IDNR's responsibility for providing all LERRDs. The estimated costs are $520,142 in cash with $1,702,000 in LERRD credit.

The IDNR would also be responsible for OMRR&R of project features. The operations and maintenance costs are anticipated to be minimal over the 50-year project life at an average annual cost of $29,575.

The IDNR also would be required to provide certain local cooperation items based on Federal law and policies. The items of local cooperation are:

1. Provide 35% of the separable project costs allocated to environmental restoration as further specified below:

   (a) Enter into an agreement that provides, prior to execution of a Project Cooperation Agreement for the project, 35% of design costs;

   (b) Provide, during construction, any additional funds needed to cover the non-Federal share of design costs;

   (c) Provide all lands, easements, and rights-of-way, including suitable borrow and dredged or excavated material placement areas, and perform or assure the performance of all relocations determined by the Government to be necessary for the construction, operation, and maintenance of the project;

   (d) Provide or pay to the Government the cost of providing all retaining dikes, wasteweirs, bulkheads, and embankments, including all monitoring features and stilling basins, that may be required at any dredged or excavated material

placement areas required for the construction, operation, and maintenance of the project; and

(e) Provide, during construction, any additional costs as necessary to make its total contribution equal to 35% of the separable project costs allocated to environmental restoration.

2. For so long as the project remains authorized, perform OMRR&R the completed project, or functional portion of the project, at no cost to the Government, in accordance with applicable Federal and State laws and any specific directions prescribed by the Government.

3. Give the Government a right to enter, at reasonable times and in a reasonable manner, upon land which the local sponsor owns or controls for access to the project for the purpose of inspection, and, if necessary, for the purpose of completing, operating, maintaining, repairing, replacing, or rehabilitating the project.

4. Assume responsibility for OMRR&R of the project or completed functional portions of the project, including mitigation features without cost to the Government, in a manner compatible with the project authorized purpose and in accordance with applicable Federal and State laws and specific directions prescribed by the Government in the OMRR&R manual and any subsequent amendments thereto. Comply with Section 221 of Public Law 91-611, Flood Control Act of 1970, as amended, and Section 103 of the Water Resources Development Act of 1986, Public Law 99-662, as amended, which provides that the Secretary of the Army shall not commence the construction of any water resources project or separable element thereof, until the non-Federal sponsor has entered into a written agreement to furnish its required cooperation for the project or separable element.

5. Hold and save the Government free from all damages arising for the construction, operation, maintenance, repair, replacement, and rehabilitation of the project and any project-related betterments, except for damages due to the fault or negligence of the Government or the Government's contractors.

6. Keep and maintain books, records, documents, and other evidence pertaining to costs and expenses incurred pursuant to the project to the extent and in such detail as will properly reflect total project costs.

7. Perform, or cause to be performed, any investigations for hazardous substances that are determined necessary to identify the existence and extent of any hazardous substances regulated under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), 42 U.S.C. 9601-9675, that may exist in, on, or under lands, easements or rights-of-way necessary for the construction, operation, and maintenance of the project; except that the non-Federal sponsor shall

not perform such investigations on lands, easements, or rights-of-way that the Government determines to be subject to the navigation servitude without prior specific written direction by the Government.

8. Assume complete financial responsibility for all necessary cleanup and response costs of any CERCLA regulated materials located in, on, or under lands, easements, or rights-of-way that the Government determines necessary for the construction, operation, or maintenance of the project.

To the maximum extent practicable, OMRR&R the project in a manner that will not cause liability to arise under CERCLA.

9. Prevent future encroachments on project lands, easements, and rights-of-way that might interfere with the proper functioning of the project.

10. Comply with the applicable provisions of the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, Public law 91-646, as amended by Title IV of the Surface Transportation and Uniform Relocation Assistance Act of 1987 (Public Law 100-17), and the Uniform Regulations contained in 49 CFR part 24, in acquiring lands, easements, and rights-of-way, and performing relocations for construction, operation, and maintenance of the project, and inform all affected persons of applicable benefits, policies, and procedures in connection with said act. Comply with all applicable Federal and State laws and regulations, including Section 601 of the Civil Rights Act of 1964, Public Law 88-352, and Department of Defense Directive 5500.11 issued pursuant thereto, as well as Army Regulation 600-7, entitled, “Nondiscrimination on the Basis of Handicap in Programs and Activities Assisted or Conducted by the Department of the Army.”

11. Provide 35% of that portion of total cultural resource preservation mitigation and data recovery costs attributable to environmental restoration that are in excess of 1% of the total amount authorized to be appropriated for environmental restoration.

12. Not use Federal funds to meet the non-Federal sponsor share of total project costs unless the Federal granting agency verifies in writing that the expenditure of such funds is authorized.

## 4.2 INSTITUTIONAL REQUIREMENTS

### 4.2.1 Sponsorship Agreement

Prior to the start of construction, the IDNR will be required to enter into a Project Cooperation Agreement (PCA) with the Federal Government and satisfy state laws and all applicable regulations (see Appendix A-3). In general, the items included in the PCA have been outlined in the previous paragraphs.

### 4.2.2 Financial Analysis

Financial information on the non-Federal sponsor's ability to fund their share of the plan is required to establish implementation of the project as required by the *Principles and Guidelines*. The information includes a preliminary financing plan outlining the costs, schedule of expenditures, and a statement of financial capability by the non-Federal sponsor, including funds. The IDNR has expressed their financial capability in their Letter of Intent (LOI).

### 4.2.3 Local Cooperation

Subsequent to public review of the draft report, the IDNR will be requested to provide an LOI indicating their support for the Recommended Plan and its willingness and intent to execute the PCA including providing the non-Federal required assurances.

### 4.2.4 Project Management Plan

A Project Management Plan (PMP) for implementation of the Recommended Plan will be prepared. The PMP will describe activities, responsibilities, schedules and costs required for the PED phase and construction of the project. The PED phase will last for an estimated 6 months at a total cost of $556,904.

### 4.2.5 Procedures for Project Implementation

Future actions necessary for project approval and implementation are summarized as follows:

1. The Corps of Engineers Mississippi Valley Division (CEMVD) Commander will review the final report and then issue an endorsement of the report to Headquarters, U.S. Army Corps of Engineers (HQUSACE).

2. The report will then be submitted to HQUSACE for review and submission to the Office of the Assistant Secretary of the Army for Civil Works (ASA(CW)) for approval.

3. Plans and Specification could be initiated upon issuance of the Division endorsement.

4. Subsequent to report approval and provision of Construction General Funding by the United States Congress, a Project Cooperation Agreement (PCA) will be required from the IDNR. The PCA serves as final assurance of local cooperation.

5. The Corps of Engineers will complete final design and plans and specifications for project construction.

6. The IDNR will be required to provide all real estate requirements for project implementation.

7. Bids for construction will be advertised and contracts awarded.

8. Upon completion of construction, the project will be turned over to the IDNR, who will be responsible for OMRR&R in accordance with guidelines provided by the Corps of Engineers.

### 4.2.6 Project Implementation Schedule

The schedule for the feasibility study is for the final report to be forwarded to CEMVD in July 2003 and for the Division Engineer's recommendation to be issued in August 2003. Execution of the PED agreement for the next phase of study is expected in September 2003, with the signing at the end of this calendar year, at the same time the Chief of Engineers' report is complete. The PED phase is scheduled to begin in September 2003 and will continue for approximately 7 months, until March 2004. The PED phase includes refinements to the design of the recommended plan, detailed bathymetric and topographic surveys, habitat and species surveys, bioassay surveys, and chemical, grain size, and density tests of the material to be dredged. Project plans and specifications will be ready by March 2004. An advertisement in the Federal Business Opportunities (FedBusOps) will be prepared during March 2004 for the solicitation of bids for construction, and the process of receiving bids and awarding construction will be completed by April 2004. Construction will begin in the summer of 2004 and last about 1 year.

### 4.2.7 Views of Non-Federal Sponsor(s) and Any Other Agencies with Implementation Responsibilities

The State of Illinois, through the Department of Natural Resources, acting as the local sponsor, supports the recommended plan. Further, the Central Illinois Light Company, P&PU Railroad, and private property owners who own lands to be used for project implementation all have agreed to support the recommended plan through use of respective properties.

### 4.2.8 Compliance with Environmental Requirements

An environmental assessment with a Clean Water Act Section 404(b)(1) evaluation was completed for this project and was submitted for 30-day public review. That document can be found in Appendix G.

Section 5

# Summary of Coordination, Public Views, and Comments

## 5.1 COORDINATION

Throughout a feasibility study, the Corps of Engineers strives to inform, educate, and involve the many groups who may have an interest in the study. This coordination is paramount to assuring that all interested parties have the opportunity to be part of the study process.

One process used for coordination is the public involvement process. Public involvement is the exchange of information with various segments of the public. It attempts to reduce unnecessary conflict and achieve consensus. The goal of public involvement and coordination is to open and maintain channels of communication with the public in order to give full consideration to public views and information in the planning process (Engineering Regulation 1105-2-100, Appendix B - Public Involvement, Collaboration and Coordination).

An effective public involvement program must identify and respond to as many affected publics as possible throughout the study and consider their input in the study's decision-making process. Content analysis is the method employed to identify public opinion, study concerns, and potential controversy. It ensures that the public involvement plan is responsive to the level of interest and concern expressed by the public, and it assesses the effectiveness of the public involvement techniques.

The main forum for receiving feedback during the Pekin Lake SFWA - Northern Unit Critical Restoration Project was through the study's open houses. The open house attendees were offered comment sheets to express their concerns and provide comments. During the study, the Corps of Engineers coordinated not only with its cost-sharing partner, the IDNR, but also with numerous groups including elected congressional representatives; Federal, State, county, and city agencies; environmental groups/organizations; businesses; media; and the unaffiliated general public.

## 5.2 PUBLIC VIEWS AND COMMENTS – AUGUST 2002 OPEN HOUSE

In July 2002, a press release was issued providing the study background, purpose, and a study update; announced an August 6, 2002, open house; stated that another open house

would be held before the study's conclusion; and listed points of contact for comments/questions.

The August 6, 2002, open house was held in Pekin, Illinois. The purpose of the open house was to provide information on the study status and on the alternatives being considered for restoring the environment within the Illinois River watershed along the Pekin riverfront and to gather comments on the alternatives. Corps of Engineers, Illinois Department of Natural Resources, and Illinois State Water Survey representatives were present at the open house to discuss the study with the public on a one-to-one basis and to receive the public's comments.

A total of 55 people attended the open house. Of those, 27% (15) returned comment sheets.

Overall, comments were very favorable regarding the open house format, displays, and the goals of the study. A strong majority of attendees agreed:

- That the open house provided an opportunity to gain information and a better understanding of the study, that the materials and displays were informative, and that they had a chance to talk to a study team member and offer comments about the study.
- That the goal of the study should be to create and restore aquatic, wetland, and terrestrial habitats and provide ancillary recreation benefits.

The majority of questions asked during the question and answer sessions were directed at how the project would affect boating, fishing, hunting, water quality, and flood heights. Ducks Unlimited provided formal written comment on the project that raised several issues. The issue of most concern was regarding the adequacy of a 1,000-gallon per minute groundwater well and pumps to provide water to the Northern Unit. The study team has since reevaluated the well and pumps design and has made appropriate modifications to address these comments.

## 5.3 SUMMARY

Various publics were identified as target audiences for public involvement and coordination, including elected congressional representatives; Federal, State, county, and city agencies; environmental groups/organizations; farm bureaus; businesses; media; and the unaffiliated general public.

The goals of the coordination process are to inform, educate, and involve the public and solicit feedback through open communication and to include in the plan formulation process all publics interested in and affected by the study recommendation(s).

The public open houses provided the public with opportunities to become informed and educated about the study and involved in the study by providing feedback to the study team. The feedback was gathered, analyzed, and used by the study team to shape the plan

formulation process and to develop the recommended plan. The study plans that are included in this report have been influenced by the public involvement process.

Section 6

# Recommendation

I have weighed the outputs to be obtained from the full implementation of this ecosystem restoration project against its estimated cost and have considered the various alternatives proposed, impacts identified, and overall scope. In my judgment, this project, as proposed, justifies expenditure of Federal funds. I recommend that the Secretary of the Army for Civil Works approve the proposed project to include constructing in Pekin Lake SFWA - Northern Unit Water Level Management, Pump & Well, Rehabilitate Slim and Round Lakes, and Sculpting for Drainage Plan in the Northern Unit.

The current estimated first cost of the recommended plan is $6,348,979 (May 2003 price levels). This total estimated project cost includes construction of the project features; planning, engineering, and design; construction management; real estate; and monitoring. Implementation would be cost shared 65% by the Federal Government and 35% by the Illinois Department of Natural Resources (IDNR), the Non-Federal Sponsor. The Federal contribution is estimated at $4,126,837 and the non-Federal contribution is estimated at $2,222,142. It is the IDNR's responsibility to provide the real estate and conduct operation and maintenance. The operation and maintenance of these features is estimated to cost $29,575 annually.

The recommendations contained herein reflect the information available at this time and current Departmental policies governing formulation of individual projects. They do not reflect program and budgeting priorities inherent in the formulation of the national Civil Works construction program nor the perspective of higher review levels within the Executive Branch. Consequently, the recommendations may be modified before they are transmitted to the Congress as proposals for authorization and implementation funding.

William J. Bayles
Colonel, U.S. Army
District Engineer